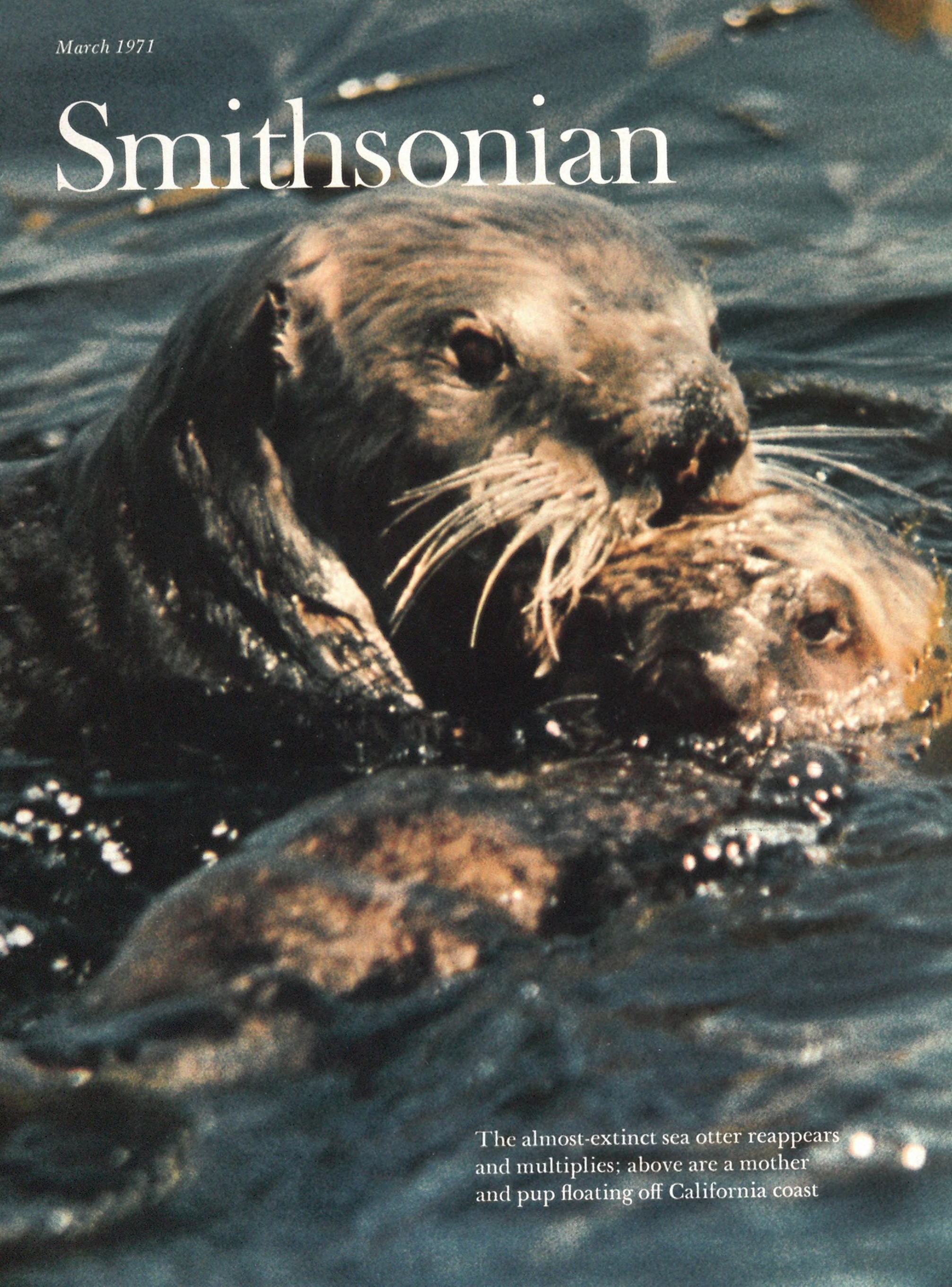
March 1971

Smithsonian



The almost-extinct sea otter reappears and multiplies; above are a mother and pup floating off California coast

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Smithsonian

Volume 1, Number 12

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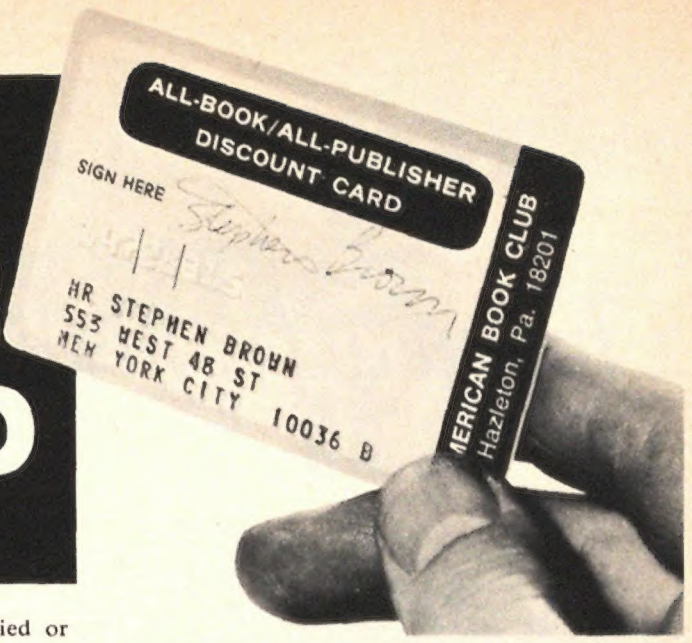

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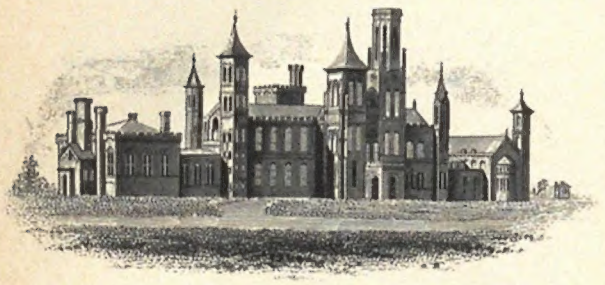
Secretary Ripley's comments

The view from the castle



The Smithsonian's Wilson Scholars pursue 'codes of behavior' in oceanography and environmental law to save our world

"No man is an island, entire of itself." Nor is any nation today. Yet despite the Bible's exhortations, love eludes us as a principle of governance. As Louis Halle described well in his speech at the Third International Symposium at the Smithsonian, the Swiss nation would long since have fallen apart if its citizens had not discovered that love and hatred were close to the same thing, engendering only wars. They saw that order could be created by substituting *manners* for affection. Manners induce a code of behavior—and thus laws of human conduct.

One statesman who knew this principle and is in turn remembered for it was our 28th President, Woodrow Wilson. The Smithsonian Institution is host to the Woodrow Wilson International Center for Scholars, now in its first year of operations. Conceived by the presidentially appointed Wilson Memorial Commission as a memorial in the District of Columbia, the Center was created by Congress in 1968. It calls for "a living institution expressing the ideals and concerns of Woodrow Wilson . . . symbolizing and strengthening the fruitful relations between the world of learning and the world of public affairs."

Under its own Board of Trustees, the Center is incorporated in the Smithsonian Institution. Its home is in the original Castle on the Mall, a highly appropriate temporary shelter, for the Castle has served as laboratory and dwelling place for many scholars since the days of Joseph Henry. Eventually the Center will create its own living and working space.

One of two basic themes undertaken by Wilson Center scholars at the request of the trustees anticipates the urgent development of international law and cooperation in the uses of the high seas and seabeds—70 percent of the earth's surface. To land today on a forgotten shore is to find everywhere evidence of man's pervasive presence: globs of oil, plastic containers, non-biodegradable, non-cycled wastes.

The Smithsonian's own oceanographic programs, with their sampling techniques, submarine explorations and long-range studies of changes in reef populations and structure, have found the same influences below the surface. Any forthcoming law of the sea will not be confined to a code of enforceable "manners" about waste disposal or accidental spills. Our dietary needs, the military's strategic uses, resource development, future transportation and additional research—all require such law. Under the direction of the trustees, the Center's first director, Benjamin H. Read, has assembled as part of the overall program a dozen fellows and guest scholars in ocean studies.

Concurrently, in late January, the Institution joined the American Law Institute and the American Bar Association in sponsoring a course in environmental law. The study deals with definition and scope, and the history of regulations regarding the use and preservation of natural resources.

In this issue of SMITHSONIAN, two articles are especially appropriate to the Center's themes. Lord Ritchie-Calder writes on the uses of oceans (page 8), and Michael Frome describes the history of conservation (page 16). It is gratifying that this Institution should serve as a sounding board for those concerned with codifying the means of using our world.

S. Dillon Ripley

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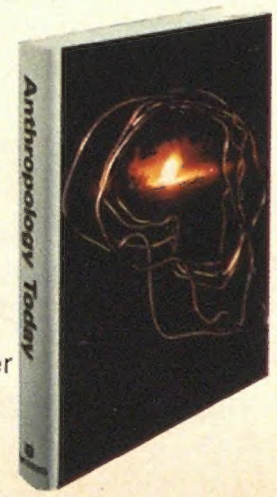

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Letters to the Editor

LSD debate

Dear Sir: Having read the LSD article in the January issue, I was disappointed to discover that one argument used so successfully against LSD, that of "hallucinogenic flashback," was ignored. Is "hallucinogenic flashback" effected only by impure LSD sold on the streets?
Ned Hudson
Greensboro, North Carolina
Author Madeleine Lundberg was given the following information about flashbacks from Dr. Sidney Cohen, professor of psychiatry and consultant to the National Institute of Mental Health: The flashback is a psychological and not a physiological (because no LSD is left in the body) effect; the more LSD taken, the more likely it is to occur. It may be triggered by stress or by other factors such as marijuana and antihistamines. The rate of hallucinogenic flashbacks among "acidheads" may be as high as 75 percent; among one and two-time LSD users it is only one percent. It is "very rare" among research subjects. The cases were very sporadic until LSD hit the streets. Flashbacks are not considered of great danger except as a hazard when driving or if it makes the subject feel he is "going crazy." They may occur weeks after taking LSD but seldom as long as a year after. Ed.

Dear Sir: Mrs. Lundberg's well-written article on LSD was such a perfect distillation of the mentality of our times, so poignantly descriptive of our shallow and sad and foolish age, that it really should be installed in a time capsule for the information of future generations.

Just one point—the true mystic enters into communion with God through grace, love and self-surrender.
Natalie Sherman
Bethesda, Maryland

Dear Sir: When I received the November and December issues of SMITHSONIAN, the first of this magazine I've seen, I considered it as a possible gift for some school children. Then I received the January issue with its *advertisement* of LSD. I don't want this issue available to them.
Martha V. Boswell
Alexandria, Virginia
The article was not an advertisement. It was a sober consideration of the scientific uses of LSD. All of the material was obtained from experts in the field. Ed.

Dear Sir: I have just finished reading the January issue of your fine magazine and I must compliment you folks for doing it again! It was a most engrossing issue, indeed.

My reason for writing is twofold. First and foremost, I refer to the article by Madeleine Lundberg on LSD research. I daresay that you will probably be flooded with mail. However, I find the article tremendously fascinating with regard to its controlled usage for medical research. The pointing out of the hysteria caused by "jumping the gun" about chromosome damage is something I think can be said not only about LSD, but about many things in the world today. I do not say that these dangers do not exist. What I am saying is that we need more of Mrs. Lundberg's quiet type of "commonsense" research reporting, rather than appeals to sensationalism.

If Mrs. Lundberg's article opens up even a few minds and stimulates even more research by the general populace into what the true effects and proper use of LSD is, then I think it will have served a most useful purpose—and should it turn out either to be the curse it is believed to be by the majority of people, harmless, or of inestimable value in medical treatment only—then we can begin to speak about "how it should be handled."
Everett C. Sweet
Stratford, Connecticut

White Clouds

Dear Sir: Mr. Hope's effort to be impartial and objective in dealing with a very controversial subject is commendable. However, I find in it some misstatements of fact.

A caption talks about claims "yet to be validated." As a result of its investigation concerning American Smelting and Refining Company's application for a special use permit, the Forest Service publicly acknowledged the validity of the company's key claims. I am not speaking for the company.

The so-called public hearings on the White Clouds issue held by the Forest Service in 1969 were, in fact, officially designated as "information meetings" for the purpose of enabling the Forest Service and ASARCO to inform the public about what was going on. The fact that the "majority of testimony opposed the creation of the mine" is meaningless. In any event the meetings were about an application for a permit to build a road so that ASARCO could find out whether there is a mineable deposit. It should be noted that they never perfected the application, and they do not yet know whether the deposit is mineable.
S. Norman Kesten, geologist
Wallace, Idaho
The author, and the caption writer, used the term 'validation' to cover a complex series of decisions involved with mining claims on federal lands. We understood that the series was not yet complete. Mr. Hope reported accurately the purpose of the Forest Service's hearings; on the other hand, he found the results of the hearing to be a meaningful indicator of public sentiment on the mining venture. Ed.

Lemmings

Dear Sir: Here is a possible explanation for the lemming paradox. Consider the journey down from the original home of the lemmings to the sea. The lemmings that reach the sea are the progeny of the lemmings that *survived* by swimming across water hazards to new breeding grounds. Unfortunately when they reach the sea there is nothing in their genetic learning experience that tells them there is a big difference between the sea and an inland lake.
L. D. Ballard
Rockville, Maryland

Color-infrared photography

Dear Sir: My eyes will not permit me to believe the photographs that appear on

pages 14 and 15 in your article, "Sensitive, remote eyes show changes on Mother Earth," in the January issue.
T. Stacy Lloyd jr., M.D.
Fredericksburg, Virginia
The U.S. Department of Agriculture photographer, who took the picture of the California reservoir, reports that the normal exposure is indeed true to the colors in that locale at that time. The bright tones in the twin picture, taken at the same season, are entirely due to infrared photography. Ed.

A cleanup of Lake Erie?

Dear Sir: Your December article on aging Lake Erie suggested a number of innovative steps that the United States and Canada might take to reverse choking eutrophication. Shortly after your article appeared, an International Joint Commission of the two countries estimated that "urgent remedial measures" for treating the waters of the lower Great Lakes would cost more than $1.5 billion. The recommendations included: prompt implementation of a vigorous program to treat municipal and industrial waste and reduction of phosphorus inputs.

I was impressed with the U.S.-Canadian study and hope that articles such as yours will spur the governments from recommendations into action.
Ruby Scherman
Stony Point, New York

Signals from cosmos

Dear Sir: Patrick Ryan's is the most magnificent and brief treatise on the panoramic picture of the modern world's predicament that I remember ever having read. It is such a mixture of scientific truth, pertinent wit, poignant raillery, realistic speculation and blistering satire, that it almost defies description. One doesn't know whether to laugh, weep, sneer or curse.
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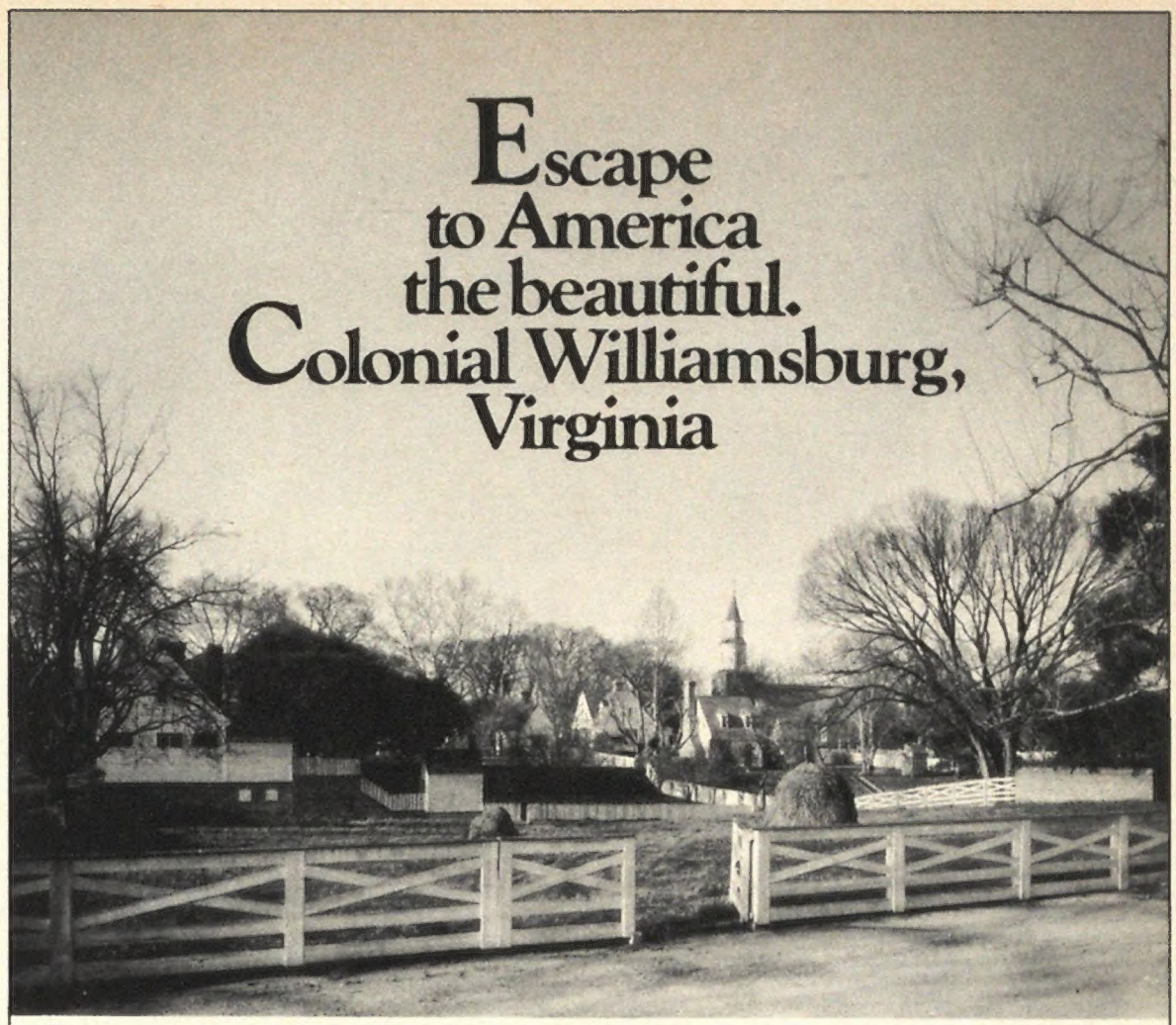

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By Lord Ritchie-Calder

Oceanic farming from surface to the deepest deep

To feed the growing ranks of the hungry
from these reservoirs of 'living soup,'
we are urged to make haste—with caution

Anything Man can do on the land surface can now be done on the ocean bed. This is a new point of departure in social evolution. As a result of quite recent developments, Man's inhibitions about the water world, from which his amphibian ancestors climbed onto dry land 300 million years ago, have been reduced and he can now aspire to the depths of new ambitions.

This is not just because of underwater equipment; the diving bell, for example, is as old as Alexander the Great. It is very considerably due to the International Geophysical Year (I.G.Y.) 1957-58 when 35 nations combined to study the Earth and when oceanographers discovered far more about the ocean bed and the waters above it. Particularly, they discovered the extent of the metallic nodules which the British *Challenger* (the first great oceanographic vessel) had brought up a century ago. During I.G.Y. these nodules were found to be so widespread on the ocean floor and so interesting in the metals they combined as to make them of real economic importance.

We had always called the ocean a liquid mine and had calculated the billions of tons of all the mineral elements which must be in solution or in suspension without daring to contemplate (except for bromine

Lord Ritchie-Calder, a prolific author on the subject of science in the service of Man, has served on numerous British and U.N. commissions on the atom, hunger and the oceans.

From undersea bunkhouses, aquatic ranch hands could tend electric-field fences while new strains of domestic fish are herded by dolphins.

Paintings by Pierre Mion

Using the world's oceans

and magnesium) the expense of separating them from the brine. Then, it was revealed that the alchemy of the sea had done the job for us by using the attractions of the manganese ions to assemble from the seawater other valuable metals in varying concentrations. The deep ocean floor, it turned out, is pebbled with these nodules. This was a mineral wealth quite distinct from the land, or indeed from the mineral oils, which sea rigs extract from the underwater continental shelf with such success that 17 percent of the world's oil and six percent of its natural gas now comes from offshore wells. By resolution, the General Assembly of the United Nations declared that the seabed and ocean floor lie "beyond the limits of national jurisdiction," and belong to no governments but should be used to "the benefit of all mankind." They constitute a property for which the international lawyers still have no adequate definition.

At the same time as the I.G.Y., the space program began in earnest. It broke the gravitational fences which had corralled Man, ushered in an era of cost-no-object experimenting with new ideas, with new materials, new control and communications techniques. It also taught us the close-quarters conditions of space-capsule survival. If Man could go to the moon, Man could tackle the unknown seven-tenths of his own planet.

A new dimension in military strategy was the third factor which speeded up the whole process to the point that Dr. John Craven of the University of Hawaii (late of the Pentagon and the Polaris project) could say in 1970: "It is technically feasible to put men, material and equipment in the deepest part of the ocean." Reconnaissance aircraft and surveillance satellites had made land-based nuclear installations visible fixed targets. To make them less vulnerable they had to be kept on the move, and, to make them invisible, the sensible strategy was to put them in the opaque depths of the oceans. On February 11, 1971, 62 nations signed a treaty which prohibits the emplacement of nuclear armaments and other weapons on the ocean bed but such fortresses were not necessary if the "deterrent" could be mounted in submarines or other kinds of submersibles. Obviously, in determining such a strategy, a great deal of oceanographic and other oceanic research had to be done and technological methods and materials developed. Many of the scientific and engineering answers have applied to civilian as well as military practices and thus the time calibration for "industrializing the ocean bed" was drastically shortened. Indeed one can say that it is imminent.

This raises vast problems—ecological, political and juridical—which are now being debated (or studiously evaded) by interested parties. In the absence of an International Ocean Regime to safeguard or wisely develop this, the common heritage of mankind, there could be an almighty smash-and-grab with indiscriminate exploitation and with hazardous consequences to the human race, and our fellow lodgers as well.

Fishing caveman style

Homo sapiens thus far has been land based. On the landmass he evolved, migrated and settled. His species has increased to the world's present population of 3.6 billion. By the year 2000 A.D. that figure will almost certainly reach at least seven billion—twice as many people to feed within 29 years, in a world in which nearly two-thirds of the present population has not food enough for human well-being. Man has not exhausted his ingenuity in producing food from the soil, as witness the miracle wheat and miracle rice which will yield at least twice as much from existing acreages. But more is needed to keep pace with the rate of population increase.

This is when we should be turning to the oceans, which could be making a far greater contribution to the world's food supply than they have done so far.

In terms of the oceans, *Homo sapiens* is still at the caveman stage; he hunts his seafood. With powered fishing fleets, factory ships, modern fishing gear, and sonar methods for locating and tracking shoals, he can hunt more efficiently and, many would say, more irresponsibly.

Just as the buffalo and the caribou were massacred with the advent of guns, so Man's increased capability of search and destroy threatens the Antarctic whales with extinction. There is, as the marine biologists continually remind us, a similar threat to many species of fish, due to overfishing of their familiar grounds or interception at the wrong

point in their migrations so that potential breeders are cut off in their prime.

Yet the world's entire sea-fishing industry contributes only a fraction of the protein which the human population needs. If all the present world catch were used directly by Man, it would supply only a small percentage of the protein needed but, in fact, more than a quarter of all the catch is converted into fish meal for animal feeding. In other words, it gets to man through a chain of diminishing returns—fish to meal to livestock to man. Valiant efforts are being made by food technologists to shorten this chain by extracting protein from fish meal, *i.e.* from fish which by size, unappetizing variety or lack of transportation or preservation would not otherwise reach the table. But such fish-meal products often are intended only to be additives to the traditional dishes.

Similarly, the vegetation of the sea has been harvested. Coarse seaweed has long been used as organic fertilizer, for "manuring" the soil. Other varieties have been used for animal feed. Most coastal peoples have discovered edible seaweeds.

All this, however, including the 63 million tons of fish caught each year, is only flirting with the vast potential of food and other human needs which the oceans, with more scientific study and proper management, could yield. We could have sea pastures, sea stud farms, sea ranches and sea truck farming.

The cycle of marine animal life depends directly on the phytoplankton, microscopic plants which drift with the currents along with microscopic animals called zooplankton. Together, these plants and animals constitute the plankton, vast tracts of drifting creatures that are the first great link in the marine food chain. The phytoplankton use the energy of the sun's rays to convert the carbon, hydrogen and oxygen in the water into carbohydrates (sugar and starch), and hydrocarbons (oils and fats) and to convert the mineral elements, nitrogen, potassium, sulfur and phosphorus, into protein. This photosynthesis takes place only in the layer penetrated by sunlight, usually to a depth of 600 feet but often not more than 200 feet.

Formerly it was believed that below this range the animal population was assumed to thin out in the dark, cold, silent realms of the deeps until in the abyss there was no life at all. This idea has been

An artificial whale with detachable "mouths" could scoop up shrimplike krill from the plankton and convert it to palatable protein.

drastically modified by human observations from bathyscaphes and by the dredgings from the deepest trenches. These have revealed what Jacques Cousteau described as "living soup," with biological activity right to the bottom of the "tureen." Higher animals—sea anemones, sea cucumbers, bivalves and amphipods—have been found to live deeper than 30,000 feet. (It is as though airmen were to encounter birds in the stratosphere!) There is an incredible diversity of creatures adapted in weird ways to survival in darkness and at pressure. It will take a long time to sort out the complexities of this web of life, but we already know enough to remind us that the sea is a living system with which we shall tamper at total risk.

That warning should also apply to any development of sea farming, with the consolation that we could be conserving by domestication those commercial species of sea life which we are now recklessly hunting to extinction.

The sea pastures are the tracts of phytoplankton, the vegetation of the sea. As long as sunlight reaches the phytoplankton, it flourishes and provides the "grazing" for the zooplankton. More than 70 percent of zooplankton consists of small crustaceans, the "insects" of the sea, which are eaten by larger ones, or directly by some fish. In the process, roughly 1,000 pounds of plants will support 100 pounds of vegetarians which in turn will support ten pounds of carnivores which, again, will provide one pound of human flesh. There must be better ways of food budgeting.

We might gather the phytoplankton. We might harvest the zooplankton. Thor Heyerdahl on the *Kon Tiki* in 1947 called plankton "good eating." The whale finds it so. The "whalebone" or baleen whales feed exclusively on the shrimplike krill in the plankton. The giant sea mammal gulps in a great mouthful of water and presses it out through the baleen, in the bristles of which the krill are trapped to be swallowed. From tons of this shrimp soup every day, the

Thermal "pollution" from the cooling systems of power plants could be used (and has been in Scotland) to warm the waters of extensive fish farms.

blue whale creates up to 130 tons of flesh and blubber, produces a two-ton calf at birth and suckles it with nearly a ton of milk every day for eight months, when the offspring may itself weigh 40 tons—a pretty good testimonial to the nutritive value of krill.

It should not be beyond human ingenuity to devise an artificial whale, a mouth-gaping submarine, which would scoop up and strain the shrimp soup, scale off the crustacean shell, "digest" the krill and preserve the protein. The Soviet *SS Knipovitch* has trawled 12 tons of krill per hour in Antarctic waters. It ought to be possible to duplicate the enzyme by which the whale dissolves the shell.

Marine ranches with marine 'cows'

The wanderings of the phytoplankton suggest shepherding shoals of fish to the plankton pastures, like our pastoral ancestors driving their sheep and goats, or cowboys rounding up the steers. Surveillance satellites already can detect lush pastures and even now fishing techniques, such as the use of submarine lights, electric pulses and sounds, suggest ways of driving schools of fish to the fattening grounds. It has even been suggested that trained dolphins could work as sheep dogs.

Another method might be to transplant fish to grounds which are consistently well pastured with phytoplankton. Sixty years ago Walter Garstang, a British marine biologist, took young plaice from the overpopulated feeding ground off the Dutch coast and moved them to the Dogger Bank, which was rich in food. The transplanted plaice had an annual growth rate three times as great as their puny brethren. That was convincing biologically and might have been so economically, even with the cost of transplanting, if the Dogger Bank had not been in international waters. Anyone could fish there at the expense of whomever did the shifting. This sort of thing awaits international agreement and financing.

Within the last 20 years, government marine biologists in Britain have demonstrated that it is possible to go back a stage further. They have raised flatfish, such as sole and plaice, in tanks from eggs to the point where they are viable in the sea. After microbial diseases in the rearing tanks were reduced by the use of antibiotics, over 65 percent of the fish survived beyond the larval stage. The hatchery plaice were then transferred to the dammed-up arm of a sea loch at Ardtoe in Scotland. The first tryout was discouraging because heavy rains diluted the sea water, rotting vegetation robbed it of its oxygen, and crab and eel predators wrought havoc with the flatfish. A cleaning-up process has improved the conditions.

Another Scottish experiment (during World War II) sought to increase the biological activity of a sea loch by using chemical fertilizers, sodium nitrate and superphosphate, which greatly increased the phytoplankton, then the zooplankton and then the bottom-living animals. Fish released into such conditions grew much faster. There was one difficulty. The loch water, which was colder in winter than the sea outside, discouraged growth and encouraged fish migration.

This can be adjusted by exploiting "thermal pollution"—the release of hot water from the cooling systems of generating stations, both nuclear and conventional. It is "pollution" when it is indiscriminate and when it upsets the offshore ecology, but it can be "managed" and used to adjust the temperatures of fish farms. This has been done under controlled conditions, in the case of Hunterston Nuclear Power Station in Ayrshire on the Firth of Clyde. Heated water is discharged not into the open firth but through the extensive seawater growing ponds.

When one goes into the business of domesticating sea creatures, one has to remember that the natural food cycle may be restricted or altered. In sea farming there may be seasonal variations in the natural supply of zooplankton and this has to be adjusted by supplementing natural production. In the British project, the zooplankton needs of the flatfish have been satisfied by constructing an automated plant for the bulk cultivation of shrimp.

Searching for a watery Ferdinand

Another threat to good husbandry is the starfish which, in direct competition, will leave food fish with only a small fraction of the nutriment available. Such invertebrates are like weeds in a garden and if they could be removed, even from the conventional fishing grounds, the yield might be ten times as great as at present. If they could be scavenged they could be a valuable organic fertilizer for the soil. Or one thinks of a selective starfish killer like the hormone weed killer and then, having thought of it, one hopes that the chemists will not come up with too brisk an answer before they have considered the side effects.

Domestication does not mean just taming the wild; it means selective breeding. We still have not reached the sea stud farm stage. Indeed, even in the experiments, we are not yet at the stage we were 200 years ago in terms of land agriculture when we turned to systematic livestock breeding. Because fishing has been catch-as-catch-can, we have settled for the huntable and developed tastes for the accessible. Maybe if we looked at the inventory of the creatures of the sea we might find others which would lend themselves to breeding and adaptation or we might start from a conventional species and finish up with some-

thing as dramatically different as Hereford cattle are from their scrub ancestry.

Not just fish: There are the sea mammals. We have wrought havoc with the whales, those swimming warehouses of fat and protein, but not usually for the food they represented. In the desperate shortages of wartime Britain, whale meat was a supplement to the rations. It was like coarse-textured steak and families did not like the fishy flavor, but, thoroughly marinated and cooked, it could masquerade as beefsteak. We now have to husband the whales for the survival of their species but the day may come again when they will have multiplied to the point where with proper management they could make a substantial contribution to the world's food supply.

Possible candidates for domestication are the whale's mainly estuarine relatives, the manatee and the dugong. They eat vegetation and have a predilection for the water hyacinth, the plant plague of many great rivers. If they could be herded up such rivers, we could get rid of a dangerous plant pest and produce substantial hunks of protein in the process. In marine ranching, they might form the starting point for domestic breeding. Some marine biologists are not enthusiastic; they say the manatee is too lethargic, but is not the land cow similarly so? We are not looking for fighting bulls. We would settle for Munro Leaf's Ferdinand sniffing a water hyacinth.

Fish farming is not new, as oyster beds and mussel beds or the brackish-water fish enclosures of the Orient remind us. But these are inshore and estuarine, and estuaries all over our industrialized world are suffering the worst pollution: Our options on these richest and likeliest domesticated fishing areas have been drastically reduced. Before long, we will have to fence off much bigger areas for the domestication of marine creatures if we are pretending to cope with a population which may double to seven billion within 29 years. The Gulf of California is a conspicuous example but there are many less ambitious sea inlets which, if set aside, could be "cultivated." It ought to be possible to provide an electric "fence"—pulses relayed across the mouth of an inlet and down to the necessary depths—to discourage fish migrations.

As the American biologist, Lionel Walford, said in his book *Living Resources of the Sea:* "If we really desire to exploit the sea fully, if it is knowledge that we need to accomplish that purpose . . . then we had better make the necessary costly investment and put full effort into the job of acquiring the knowledge."

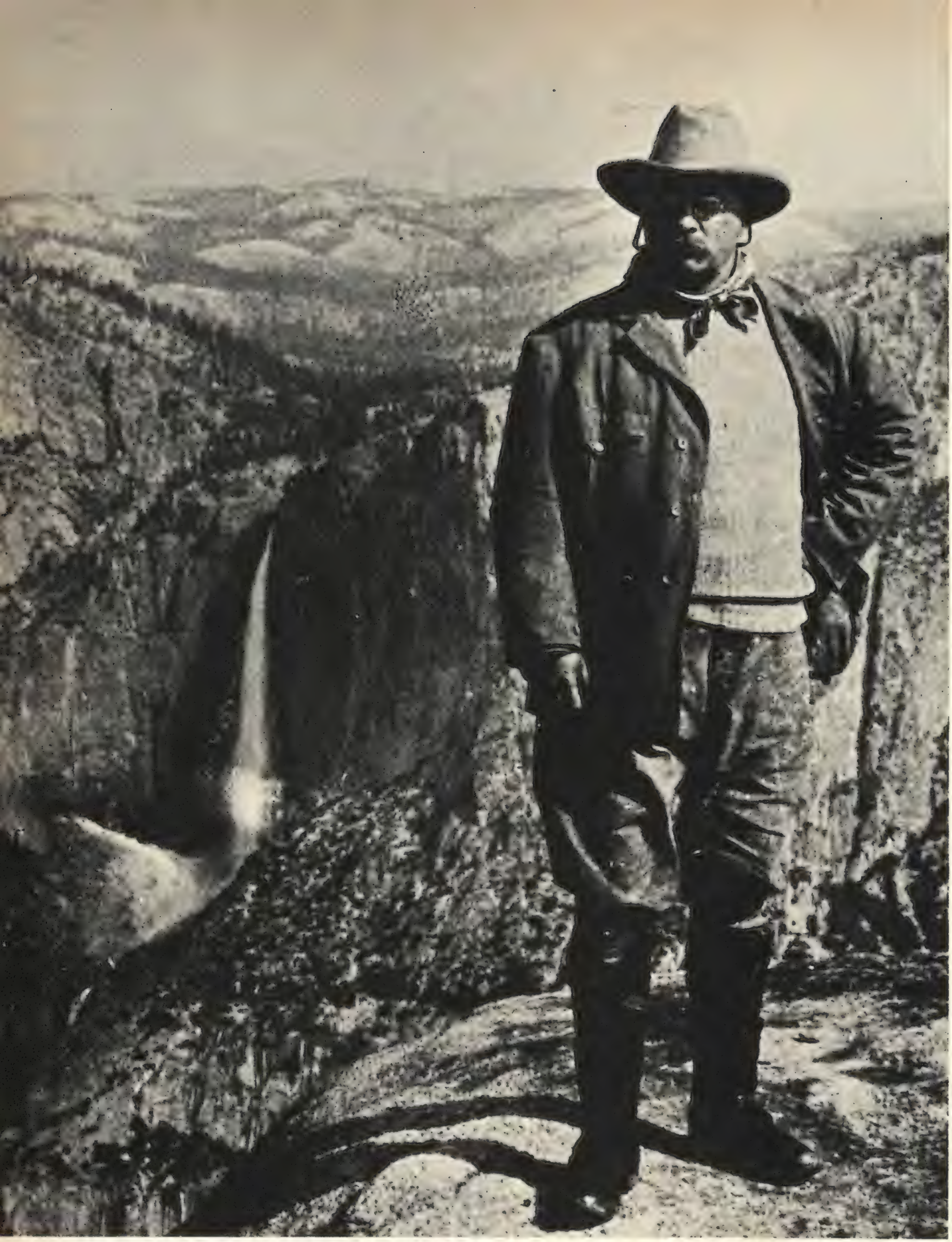
That is the rub. We need to have knowledge not only to tell us what we can do but what we cannot do. The shortcuts which may be taken to grab the mineral wealth could lead to the open dredge mining of the ocean bed with no insight into the effects which might ensue to that web of life, reaching all the way down, of which we are only now becoming aware. We can, by our reckless pollution, poison that soup tureen. One thinks immediately of the high mercury content recently discovered in many commercial fish. Military strategists can promise that no weapons of mass destruction will be emplaced in the ocean bed but they do not mention nuclear mines which need not be implanted but which could explode at depths. This could produce radiation mutations with unpredictable effects on the food chain.

The need to hurry slowly

Finally, while we debate academically the relation of the photosynthesis in the upper layers to the ecology of the rest of the system, we may be interfering with the whole process. If it is true, as Thor Heyerdahl has said after his voyage on *Ra II,* that a layer of oil pollution is covering the entire surface of the ocean, we must ask if the effects will be to reduce the penetration of the sun's rays to those critical depths in which planktonic generation is produced.

In asking that we should do all we can to increase the biotic potential of the oceans, one has to remind oneself of what Claude Bernard, the great French biologist, said a century ago: "True science teaches us to doubt and to abstain from ignorance." What he meant was not a reluctance to go forward but, like going into an uncharted minefield with a mine detector, to make sure of each foothold of knowledge.

Research vessels, in what we always thought was an inky void, are finding a complex web of deep-ocean life we tamper with at great risk.



Theodore Roosevelt visits a bit of the wilderness he championed. Yosemite Falls thunders far behind him in the California park that became national in 1890.

By Michael Frome

The story of conservation stretches back to our land's early inhabitants

Indians revered the spirits of nature;
farsighted white leaders struggled
to save it—and so showed us the way

Conservation or environmentalism or ecological responsibility—or whatever you choose to call it—had its beginnings in the dim past. The concept was fundamentally the same as that which today's environmental movement is striving to achieve—a way of life based on careful husbandry of natural resources, elimination of waste and over-consumption, and respect for natural systems above the man-made.

Consider the ancient Cherokee. They believed human personality and the web of life must be tended with passion and reverence, based on a heritage derived from the earth itself. Their idea was to "celebrate life," as our modern young activists say. Now we call it the pathetic fallacy, but every animal, stone and tree was believed to have its own spirits and particular reasons for being. Ceremonials were devoted to fulfillment of Man's role in the grand design of the universe.

The Cherokee threatened nothing. They considered the plant world friendly, willing to cooperate with their medicine men in counteracting jealousy and hostility of animals. The radishlike root of the ginseng, "the little man, most powerful magician," was used for medicinal purposes, but the medicine man spoke of it as a sentient being; when he hunted it in the hills, he would pass over the first three plants, then ask permission of the fourth to cut a small piece of its flesh.

According to the accepted script, white pioneers were too preoccupied with growth to consider saving resources for the future. But this is not exactly so; a review of our history reveals alternatives and warnings presented continually along the way.

The Bartrams, father and son, figure prominently among the early non-Indian environmentalists. The elder, John, born in 1699 on a farm outside Philadelphia, was the first great native botanist of the New World. Instead of destroying, he conserved by collecting seeds and plants in the far wildernesses of the Great Lakes, Canada and Florida. He was a leading intellectual, whose Botanical Garden beside the Schuylkill was frequented by writers, artists and scientists eager to follow his course in natural history.

The principal beneficiary of John's teaching was his son William, who sometimes accompanied him on his explorations. William, in turn, conducted his own four-year probe of the southern wilderness, which resulted in his classic book now known as *The Travels of William Bartram*. He perceived and described the interdependence of living things: the spider preying on the bumblebee, which had lit to feed on the leaf of a plant; a coachwhip snake wreathing itself around the body of a grounded hawk; the battle between crayfish and goldfish, the swarming alligators feeding upon a bank of fish. It was the same theme repeated from the primitivism of the Indian through the transcendentalism of Thoreau and Emerson to the ecology of our own Aldo Leopold, Olaus Murie, Rachel Carson and others.

William Bartram avoided involvement, preferring the sanctuary of the gardens left by his father. He declined appointment as botanist on the Lewis and

Columnist and editor Michael Frome has reported conservation for years. His award-winning book, Strangers in High Places, *deals with life in the Great Smoky Mountains of the Southeast.*

Artist-naturalist George Catlin with Indian models was depicted in 1849 by William Fisk.

Clark expedition. But men sought him out. He took in a young Scottish poet and school teacher, Alexander Wilson, whom he taught to observe, study and paint, setting him on the road to becoming "father of American ornithology." In 1804, Wilson undertook a two-month walk across high mountains and dangerous rivers to Niagara. Then he walked across Pennsylvania and embarked in a skiff down the Ohio, visiting Indians and writing biographies of birds in the woods. "I smile to think," he wrote his old master, "that, while others are immersed in deep schemes of speculation and aggrandizement, I am entranced in contemplation of a lark, or gazing like a despairing lover on the lineaments of an owl."

Such antipathy for exploitation was often expressed by artists and writers of the early 19th century. "The most distinctive, and perhaps the most impressive, characteristic of American scenery is its wildness," wrote Thomas Cole, leader of the Hudson River school of painting, in 1836. In his poem, "Lament of the Forest," he grieved at the way man was invading the New World sanctuary. James Fenimore Cooper, the first significant American novelist, was overcome with utter revulsion. His hero, Natty Bumppo, honored wilderness and exemplified wise use. "This is grand!—'tis solemn!—'tis an education of itself to look upon!" exulted Natty, the Deerslayer, on viewing Lake Otsego, the "Glimmerglass," where a man could stand on the shore and hear the song of the panther from the encircling forest. And again, said Natty, now in despair, "They scourge the very 'arth with their axes. Such hills and hunting grounds as I have seen stripped of the gifts of the Lord, without remorse or shame!"

But how to save hills and hunting grounds from despoliation? The first call for specific action apparently came from George Catlin. When this explorer and artist steamed up the Missouri River into the Mandan country of the Dakotas in 1832, prairie dogs barked from the tops of their mounds and buffalo ran in fright. However, he observed a large number of Indians camped near Fort Pierre slaughtering buffalo to trade for whiskey, and realized the extinction of Indian and buffalo were imminent—"before the deadly axe and desolating hands of cultivating man."

Catlin furnished invaluable depictions of the Indians in the fullness of their bloom with his heroic portraits of Osceola and Keokuk, of the Sioux, Comanche, Kickapoo, Chippewa and the remnants of the Six Nations in northern New York. The human resource was part of his dream that large sections of the Plains be preserved "in their pristine beauty and wildness, in a magnificent park, where the world could see, for ages to come, the native Indian in his classic attire, galloping his wild horses amid the fleeting herds of elk and buffalo."

Although Catlin's pleas were not heard, William Cullen Bryant's proved more successful. In 1836, he began promoting the idea of a city park on a tremendous scale for New York. It took a considerable effort to achieve, but with the support of two noted landscape architects, Frederick Law Olmsted and Calvert Vaux, Central Park finally was established in 1857—and is probably the most valuable parcel of open space in the world today. During the mid-century a mood and movement swept over the country, in reaction to unrestrained expansionism. In California, the sequoia groves catapulted into world attention as a result of the stripping of one giant tree in Calaveras Grove. Public interest led Congress to enact a law withdrawing Yosemite Valley and Mariposa Grove from the public domain and granting them to California as a state park.

Emerson and Thoreau speak up

The movement to defend the natural environment had eloquent spokesmen in the sages of New England. In his renowned essay, *Nature,* Ralph Waldo Emerson defined the true ethic as a concept of spiritual morality and integrity. "To the poet, to the

philosopher, to the saint, all things are friendly and sacred, all days holy, all men divine," he wrote, in the tradition of old William Bartram. "For the eye is fastened on the life and slights the circumstance."

"This curious world which we inhabit," insisted Emerson's friend, Thoreau, "is more wonderful than it is convenient; more beautiful than it is useful; it is more to be admired and enjoyed than used."

Thoreau has been mocked as a hermit for those "impractical" excursions to Walden, Monadnock and Cape Cod, and for plunging into the wilds of Maine and Canada, but his implicit practicality becomes more apparent with the years. He foresaw unchecked exploitation headed on a course that ultimately would devour all wild nature on the continent—perhaps on the entire globe—and warned that some wilderness must be preserved. He had no quarrel with civilization, but defined wilderness as a necessary component. If it were not recognized as such, man would destroy himself in destroying nature.

"In Wildness is the preservation of the World"—this quotation from Thoreau is often used as the motto of the Wilderness Society. Though he published only two books during his lifetime (*A Week on the Concord and Merrimack Rivers* and *Walden*), his collected works, including his journal, or "daybook," run to 20 volumes, a mine of discoveries and observations. He warned against having "every part of man cultivated," for to subject everything in man to rational and conscious control would be to warp, diminish and barbarize him. So, too, the reduction of all nature to use for profit would end in the dehumanization of Man. As an antidote, he proposed a network of national preserves "for inspiration and our own true recreation," plus a natural area within each community.

Scottish-born John Muir adopted the American West and became its spokesman and philosopher.

Professional forester Gifford Pinchot casts for trout. He taught the concept of multiple land use.

An unbridled rape of nature

Thoreau spoke in defense of the environment, but functioned essentially alone. Following the Civil War, this would no longer do. The railroads opened the Western Empire and were rewarded with immense gifts of land from the public domain. The cowman, sheepman, buffalo hunter, miner and logger marched across the continent and left destruction in their paths. The buffalo, which had numbered 60 million or more in great herds, almost vanished from the face of America. The chaotic, devastating grazing upheaval, known as the "beef bonanza," left in a single generation scars and damages on the land that may never be erased. Millions of acres designated to aid settlers passed into the hands of mining and lumber syndicates and speculators. It was an era of unbridled rape of nature.

A few voices were raised against the tide. Carl Schurz, German-born Secretary of the Interior of the

The felling of a giant California sequoia was cause for celebration atop the 25-foot stump . . .

mid-1870s, understood the values of conservation from memories of his native land. He called for a reversal of public opinion, "looking with indifference on this wanton, barbarous, disgraceful vandalism; a spendthrift people recklessly wasting its heritage; a Government careless of its future."

Enter Major John Wesley Powell, scientist and intrepid explorer of the Green and Colorado Rivers. He urged preserving the country's natural wealth against exploitation and monopoly control. The western livestock grower, according to Powell's invective, was "a trespasser on the public domain, an obstacle to settlement, and at best a crude forerunner of civilization."

Powell was primarily a scientist, who served as director of the U.S. Geological Survey. He served also, from 1879 to his death in 1902, as director of the Bureau of American Ethnology at the Smithsonian Institution. He recognized that many Indian conflicts could have been avoided, except for the white man's ignorance and lust for profit. Though Powell and his trained investigators failed to conserve the habitat of the native people (as Catlin had hoped to do), they recorded Indian arts, industries, music, drama, ceremonies.

The idea of saving something from the public domain for the nation's future was advanced considerably in 1870, when a group of explorers—called the Washburn-Langford-Doane party—spent almost four weeks investigating the Yellowstone country. One evening around a campfire, they decided that, instead of claiming this frontier wonderland for themselves, they would share it as a "public park or pleasuring ground for the benefit and enjoyment of the people." It was a revolutionary idea, but two years later the first national park—first in the world—came into being.

Meanwhile, John Muir was leading the fight to preserve the giant sequoias of Yosemite from the timber barons and the fragile slopes above them from the sheep growers. Muir was a long-bearded, long-legged,

. . . and bagging 177 ducks in two days produced
a proudly posed picture to prove the hunter's skill.

uncommon champion of nature and of his fellowman, who wrote, "There is a lover of wild Nature in everybody, an ancient mother-love showing itself whether recognized or no, and however covered by cares and duties." The mountains, he observed, are like fountains, not only of rivers and fertile soil, but of men—and going to the mountains is like going home.

Born in Scotland in 1838, Muir came with his family at the age of 11 to live on the Wisconsin frontier. He enrolled for a time at the University of Wisconsin, then departed without a degree for the "University of the Wilderness," stretching a thousand miles along the Southeast which he covered afoot. This was only a prelude to his western adventures, when he worked first as a shepherd, then as a sawmiller. He ranged over the West, including Alaska and across the Bering Sea, but his special kingdom was Yosemite. He was in great demand as a writer, for he described mountain scenery in terms combining science and poetry.

In collaboration with his friend and editor at *Century* magazine, Robert Underwood Johnson, Muir crusaded for a national park in Yosemite. Congress responded in 1890 by reserving 1,500 square miles surrounding Yosemite State Park as a national park (and 15 years later accepted return of the valley from California). Then Muir and others proceeded to promote conservation through the Sierra Club. The founders originally had in mind encouraging wise use and protection of the Sierras and other western mountains, but the club has since grown into a leading spokesman for wild areas throughout the nation and the world. Muir himself fought resource exploitation, whether by grazing, logging, water development or tourist-booming. Still, he knew the national parks were not designed to keep people out; he objected to roads but not to use, for "Good walkers can go anywhere. . . ."

The impact of the conservation movement was

Continued on page 25

The heritage we have so far saved: a portfolio

Thousands of square miles of our land have been set aside as national parks and monuments to safeguard their beauty and rich significance. Yet all are under the threat of overuse, of pollution in the future. Ansel Adams, famed photographer of western wilderness, presents three such areas. Above, the upper canyon of the Lyell Fork of Yosemite's Merced River. It is now highly vulnerable to too many visitors.

Lake McDonald, in Glacier National Park,
could be despoiled by sewage and lumbering wastes.

Teklanika River, Mount McKinley National Park,
is too remote to be polluted by civilization.

widely felt. In New York, the falls of the Niagara River were rescued from private exploitation with authorization of a state reservation in 1885. That same year the legislature established the Adirondack Forest Preserve, then later reinforced its sanctity with a constitutional amendment guaranteeing that the area would be ". . . kept forever as wild forest lands." In New England, the Society for the Protection of New Hampshire Forests was organized in 1901 and proceeded to acquire such choice areas as Crawford Notch, Sunapee, Lost River and Monadnock.

These events were parts of a great surge of activism, which reached its peak during the Presidency of Theodore Roosevelt (p. 16). The most influential spirit in the movement was provided by Roosevelt himself. He was a skilled observer, who debunked the school of pseudonaturalists known properly as "nature fakers"; they peddled old wives' tales attributing human qualities to wild animals (anthropomorphism). In 1887, at age 29, he and a handful of others organized the Boone and Crockett Club, an influential cadre of "American hunting riflemen" determined to spearhead an assault on problems facing our dwindling big game, public lands and forest resources.

In one case, the fraternity of hunters blocked a railroad through Yellowstone, even in the face of imminent Congressional approval. In another, they tackled the profiteers known as market hunters (also as "butchers," "hide hunters" and "game hogs"), who preyed upon passenger pigeons, cranes, plovers, other birds and mammals. Joining with various Audubon societies and the American Ornithologists' Union, which had been fighting to control plume hunters, they made it a federal offense to ship interstate game killed in violation of state law.

When Roosevelt was thrust into the Presidency he was ready to act. Congress had authorized the President to make withdrawals from the public domain for a new entity of land classification called forest reserves. Two of his predecessors, Benjamin Harrison and Grover Cleveland, had withdrawn a combined total of 34 million acres. But Roosevelt, during his nearly eight years in office, despite fervent, sometimes violent opposition, set aside by executive order 148 million acres. It was very likely his most important and enduring contribution to the nation.

Roosevelt could move boldly because he was surrounded by strong men. One of his closest associates was George Bird Grinnell, naturalist, Indian scholar and editor of *Forest and Stream* magazine. Grinnell founded the New York Audubon Society, the first such organization in America, fought the land grabbers of the West and led the movement to establish Glacier National Park in Montana. Though personally modest, he was a two-fisted publisher, prominent in virtually every major conservation crusade of his time.

Although "T.R." knew and admired John Muir and had camped with him in Yosemite, he was most influenced by Gifford Pinchot, an apostle of use rather than protection, or as Pinchot would say, "of preservation through use." He had returned from forestry studies in France in 1890 as the first native-born American to complete graduate training in this profession. In his first assignment, the development of a forest plan for the Biltmore Estate of George Washington Vanderbilt in western North Carolina, he introduced selective logging, planned reproduction and trespass control. Although a single-minded, often uncompromising idealist, his manner inspired others. He emerged as a giant figure in conservation history.

1908 conference spells out conservation

Pinchot, who became the first chief of the U.S. Forest Service, was of the age of social reformers, of Jane Addams, Lincoln Steffens, Ida Tarbell and the trust-busters. He saw forestry as part of the crusade "against control of government by big business." The Roosevelt-Pinchot policies opposed useless waste and fought special privilege on a wide front. For example, the Inland Waterways Commission of 1907 warned against monopoly control over forests, waters, lands and minerals, charging that an excessive share of natural resources had already been "diverted to the enrichment of the few rather than preserved for the equitable benefit of the many." Then followed the historic 1908 White House Conference of Governors, which Pinchot described as "the first national meeting in any country to set forth the idea that the protection, preservation, and wise use of the natural resources is not a series of separate and independent tasks, but one single problem."

Although the emphasis placed by Pinchot was on use (resulting in a major falling out with Muir over invasion of Yosemite for the Hetch Hetchy Reservoir in 1913), the Forest Service under his leadership safeguarded millions of acres of wilderness. "To the broad vision of Pinchot we owe much in the development of attitudes that now make possible the preservation of natural areas, at a time when the need is so deeply realized," wrote Howard Zahniser, then executive director of the Wilderness Society, soon before passage of the 1964 Wilderness Act.

A forester trained under Pinchot, Aldo Leopold, brought the philosophy expressed by Muir and Thoreau full cycle back to that of Bartram and the Indians. As early as 1924 he was instrumental in establishing a designated wilderness area and in advancing the wilderness protection principle. In *A Sand County Almanac* and *Round River,* he rekindled the ancient "land ethic" and "ecological conscience," based on responsibility of man to the rest of the earth and the interdependence of living things. "The outstanding scientific discovery of the twentieth century," he wrote in 1947, a year before his death, "is not television or radio, but rather the complexity of the land organism. The last word in ignorance is the man who says of a plant or animal, 'what good is it?' If the land mechanism as a whole is good, then every part of it is good, whether we understand it or not."

During the depression years, attention had focused on devastation of all kinds. Franklin D. Roosevelt treasured nature and the outdoors, and his New Deal provided a massive thrust to restore both land and people, through such programs as the youth-oriented Civilian Conservation Corps. Forestry and parks expanded at all levels of government. Game protection (under cartoonist-naturalist Jay N. "Ding" Darling), soil conservation (under Hugh Bennett), fisheries, archaeology and other programs came into their own.

Since World War II the history of conservation has been a race against time. The destruction of natural resources has proceeded much more rapidly than protection or restoration. There have been significant Congressional actions, such as passage of the Wilderness Act, making the United States the first country to recognize through legislation wilderness as part of its culture and legacy to the future, Land and Water Conservation Fund Act, Endangered Species Con-

Yosemite tourists, in a park that was saved but has become overcrowded, get shuttled to the view points as the park service seeks to ease traffic and pollution.

servation Act, National Trails System Act, National Wild and Scenic Rivers Act, Air and Water Quality Acts and National Environmental Policy Act. But these came during the 1960s, otherwise known as "the age of poisons" and of urbanization, when an affluent society used endless quantities of "disposable" products with little thought of where they came from or where they must go, and with scant inclination to save, or repair, anything older than yesterday.

We are too close to the happenings of our time to interpret them as history. Yet if one event stands out at the beginning of the new decade, it is the Environmental Teach-In of April 22, 1970 (SMITHSONIAN, June 1970), when young people asserted their "earthright" to life on a habitable planet. Their demands are just. The ultimate effect of both uncontrolled population and expanding technology are fearful to anticipate.

Young people have forced their elders to realize that without a more firmly established conservation ethic, the nation is not equipped to face its future. Mechanically and technically, perhaps, we have the skills to explore the lunar surface and exploit the treasures of the sea, but intellectual and ethical values still lag behind. We now have the power to effect changes in the total environment of Man. But it is also possible that before we learn the full extent of this power, our blunders may injure the entire human race.

"No generation can be allowed needlessly to damage or reduce the future general wealth and welfare," warned Gifford Pinchot in 1910, "by the way it uses or misuses any natural resource." On this basis the environmental record must be written.

By Sidney S. Walcott

How I found my own fossil

Happiness is having a Middle Cambrian arthropod named for you, recalls the son of a former Smithsonian Secretary

When you return to scenes of your youth after years of making a living, memories come flooding back of sights and sounds and people long since forgotten. So it was when I returned to the Canadian Rockies of British Columbia, after an absence of 42 years. I recalled again the rustle of a porcupine's quills, the whirring wings of the fool hen, the gentle patter of rain on the tent fly, the gurgle of the mountain brook near the campfire. Again I scented mountain air, bacon and coffee cooking on a cold morning, the spruce boughs that formed my mattress, the sweat of my cayuse on a hot afternoon.

My back creaked a bit as we zigzagged up the trail from Field to the top of Burgess Pass. But the view was the same as when I was a boy—the sheer cliff of Mt. Burgess, the jewel of Emerald Lake, the vast ranges stretching far into the distance.

I had come because of a conversation with a geologist in Calgary, Alberta. He had looked at my card and then asked: "Are you related to Dr. Charles D. Walcott of the Smithsonian Institution?"

I told him that Charles D. Walcott was my father.

Then the scientist startled me by asking, "You are not by any chance *Sidneyia inexpectans,* are you?"

I acknowledged that that was my name half-a-billion years ago.

"Well, I've heard of you from my early teachers and I have told many classes of my students about you, but I never thought I would meet you in the flesh. You don't look quite like your pictures."

His words took me back to 1910, when, at age 17, I discovered the unusual fossil that now bears my name.

We left Washington in June that year and picked up horses, guides and pack outfit at Lake Louise. Searching for fossils, my father worked his family party west over the Continental Divide and down to Mt. Stephen and the Yoho Valley. He was measuring the thickness of rock strata and studying the extraordinary geology of the Canadian Rockies.

On a July day, as we crossed over Burgess Pass on our way to Field, father suddenly told me to halt the packtrain. I signaled, and the horses started to browse at the side of the trail. Often on our summer camping trips I had seen father throw stones and logs out of the trail to make the going a bit easier for the horses. So it was no surprise to see him upend a slab, worn white by the shoes of horses slipping on it for years. He hit it a few times along its edge with his geological hammer and it split open.

"Look, Sidney!" he called. I saw several extraordinary fossils on the rock surface. "Let's look further tomorrow," he said. "We won't go to Field tonight."

We placed our "find" gently on the upper side of the trail where it would be safe. Above, toward the summit of Mt. Field, there was a long talus of loose rock which had come down from above. Somewhere up there our slab had been loosened from its bed and found its way down the slope.

We found a perfect campsite half a mile farther on, and the next morning we returned to the rockslide to test the slabs. We worked our way up, trying to find the bed of rock from which our original find had been dislodged. A week later and some 750 feet higher we decided that we had found the site. There were no further signs of fossils above. We then began testing the solid layers where rock cropped out and had broken off.

"Our quarry"—geologist's paradise

Thus we found what we came to call "our quarry." There had never been anything like this fossil bed. You could crack open a big piece of shale and find six or ten or more different forms of life depicted. Even as a kid you get a thrill out of that.

My father wrote of this geologist's paradise: "The most readily destroyed organisms, like the jellyfish, have been exquisitely preserved; and we have crustaceans of numerous varieties, many of which preserve the most delicate branchiae and appendages."

One day I called, "Come see what I have"—an almost daily shout from one of us. Father came to look. It was a crablike creature with claws in front. It was bigger than the palm of a man's hand; it was new; it was important—more important than the lace crabs, the crayfish, the jellyfish, the trilobites, all the others. It

was a new genus. And eventually it was named for me: *Sidneyia inexpectans.*

I had no idea at the time that I was such an important crustacean and I scarcely thought about it until that day in Calgary. Then I learned that at the time of discovery my fossil represented the highest known form of animal life from Middle Cambrian rocks found anywhere in the world. It is a specialized arthropod, one of the higher stages of "low life." Fossils have been found in all parts of the world, but perhaps never as perfectly preserved as in this small fossil bed on the western slope of Canada's Mt. Field, some 8,000 feet above the sea.

To our family, back in 1910, it seemed a miracle that Father's simple act of thoughtfulness for the comfort and safety of a few packhorses led to this discovery. Thanks to him my namesake now rests in a research collection in the Smithsonian Institution (see below).

Author (left) helps prepare skins for study while his father, Secretary Charles D. Walcott, warms himself at a campfire in the Rockies.

Sidneyia inexpectans, immortalized on a slate slab, lies in the Smithsonian's National Museum of Natural History. This fossil is about four inches long.

By Hal Roth

Sea otter population now booming modestly in western waters

Hunted close to extinction for their fur, they are back by tens of thousands off Alaska, by the hundreds off California

One day in the spring of 1938, Howard G. Sharpe happened to look down on a remote ocean beach south of Carmel, California, and saw some 50 dark-colored animals swimming just offshore. At first Sharpe thought they were seals or sea lions, but after watching them through a small telescope he wasn't so sure. They had flattened heads, long tails, forepaws and webbed hind legs or flippers and shoebrush moustaches. They spent most of their time floating on their backs in a sort of family group. Many appeared to sleep while others played.

Sharpe contacted Dr. Harold Heath of the Hopkins Marine Laboratory in nearby Pacific Grove. From the description, Heath had a hunch what the sighting might have been, but he wasted no time in guessing. He hurried down to the coast to confirm it. Sure enough, the sea otter (*Enhydra lutris*) had returned. The species, a larger distant cousin of our more familiar fresh-water otter, had not been reported along the California coast for a generation.

Since 1938, the sea otter population along the California coast has continued to grow. A 1970 census reported 1,040 animals, an astonishing gain from the few seen by Sharpe and others. Their range, too, has extended. Biologists have made a careful evaluation of some 140 miles of shallow waters where the animals are now living and reported that "the coastal population has probably distributed itself so that it is more or less in balance with its food resources."

In Alaska the once almost-extinct animals have increased to more than 30,000. Alaska wildlife experts have found that in some island groups there are too many otters for the food supply and they have recommended limited hunting. Each year now, under the watchful eyes of state biologists, 500 to 700 otters are slain in the Aleutians. This harvest controls the population and conserves the range. What an ironic twist that hunters should now help to save the mammal they nearly wiped off the face of the earth.

The story of the sea otter comprises a remarkable chapter in American history. The struggle to settle California, even its eventual statehood, resulted in large degree from the fact that the sea otter, unlike many sea mammals, does not have a layer of blubber under its skin, but is insulated from the chilly Pacific by air trapped in the closely packed fibers of its fur. Loose and extremely thick, the pelt of a five-foot otter stretches to six feet or more. Warm and lustrous, it forms a beautiful garment for human wear.

Thus in 1742, when Russian traders pushed eastward from Siberia along the Aleutian Islands, they found in these animals the source of fabulous profits. These traders followed the wake of the great explorer Vitus Bering, seeking to exploit his discoveries. They particularly wanted to collect sea otter pelts, since these were prized in China above the finest sable, marten or fox. Emperors wore the mag-

California sea otters will brave crashing surf and spuming outlets to get a sea urchin for dinner.

California free-lancer Hal Roth has covered many wilderness subjects. He has produced a book and lecture on his recent 19-month Pacific voyage with his wife in their small sailboat.

Floating on the air trapped by its thick fur,
a sea otter drapes itself with a strand
of kelp to keep from drifting away. Otters preen
endlessly, since dirt destroys insulation.

The sea otters multiply

nificent fur—all the more luxurious because it was so hard to get.

The Russian traders, *promyshlenniki,* used native Aleuts to hunt the animals and shipped hundreds of casks of skins through Kiakhta, on the Chinese-Siberian border, to the markets of China. All this Russian activity in Alaskan waters gradually began to disturb the Spanish administrators of California, who, in a desultory way, governed a population of a couple of hundred whites.

Curious about Russian intentions, Spain sent ships to the North Pacific. The seamen of one vessel, the *Santiago,* showed a few iridescent abalone shells to some northern Indians. Eager for them, the Indians offered in exchange some fine otter pelts. Thus was Spain initiated into this enormously profitable trade.

Down in Alta California, soldiers and missionaries began buying skins from local Indians, paying practically nothing. In 1784, one Vasadre y Vega made an ingenious proposal for direct trade between California and China. Spanish mines in Mexico desperately needed quicksilver to extract gold. China had plenty of that, but never enough otter skins. Why not barter one for the other? The idea was sound, but the trade failed because of squabbles among the Spaniards, lack of trained Indian hunters and the scarcity of suitable goods with which to pay them. Even so, in the four years between 1786 and 1790, nearly 10,000 otter and seal skins were shipped off to Manila for $3,120,000.

Indians or Aleuts used kayaks to slip up on the shy and clever animals as they lolled on their backs in kelp beds. Sea otters dive to escape danger, often swimming against wind or current as if to make it harder for a boat to follow them. Hunters killed them with arrows, spears or muskets and sometimes, getting close under cover of a storm, with clubs.

In 1776, Captain James Cook, already famous for his South Pacific voyages, brought sea otters to the notice of the world at large. Seeking a passage to the Atlantic, he brought his ship into Vancouver Island, where his crew did some trading with the Indians.

"The explorer and his men obtained from the natives at Nootka and other points a quantity of sea otter skins of whose real value they had no proper idea," wrote Hubert H. Bancroft. "Most of the furs had been injured by being made into garments; they were used for bedclothes on the voyage and preserved with but little care; two-thirds of those obtained were spoiled or given away in Kamchatka, and it was thought that the full value was not obtained in China; yet the remnant was sold for about ten thousand dollars."

One of Cook's captains reported that "the rage with which our seamen were possessed to return to Cook's River, and by another cargo of skins, to make their fortunes, at one time, was not far short of mutiny."

Yankee ships discover the trade

Within a few years of the published account of this voyage, a dozen fur traders had commenced voyages to the northwest coast of America. American ships began to trade with China during these years just following the American Revolution. They would weather Cape Horn with New England cargoes, add copper from Chile and sandalwood from Hawaii, then head for Canton. But the demand for sea otter and fur seal pelts was so high in the Orient that it wasn't long before many Yankee ships detoured to California and points north.

In China, the governing mandarins wore otter skin robes. Women of high position had otter capes. Often, leaders wore sashes and belts of otter skin decorated with precious gems. Otter tails went into hats, gloves and trimmings. Lush pelts were often combined with rich silks for gowns and formal wear. One authority noted: "By 1790 a sea otter skin commanded in the Chinese market a price of from $80 to $120."

Unfortunately for the enterprising Yankees who tried to crack this market, Spain's Charles IV passed an edict forbidding Spanish trade with foreigners. The officials of Spanish California had no choice but to discourage ships from Boston and other American ports. Of course the Yankees managed to trade on the sly, but they had no otter hunters, and, as the Spanish got tougher, American troubles mounted. In one case the Spanish imprisoned a Yankee skipper for two years after confiscating his cargo.

In October 1803, Captain Joseph O'Cain of Boston anchored at Kodiak Island to call on Russian Gov-

A rare photograph of a sea otter on land shows the bloody nose suffered by females when males hold them by the snout during mating. They mate in the water, but may bear young ashore.

ernor Alexander Baranov. O'Cain described new, lush otter hunting grounds in California and offered to supply transportation and a ready market if Baranov would furnish Aleut hunters and kayaks. The profits would then be split. The scheme seemed sure fire, and Baranov accepted it.

O'Cain took 40 hunters and 20 kayaks and headed for San Diego and Baja California. The following June he arrived back in Kodiak with 1,100 skins plus an additional 700 furs purchased from the Spanish. The new scheme prospered and expanded to a handful of Yankee ships, one of which carried 150 Indian hunters and 70 to 80 kayaks. Hundreds of otters were slaughtered, and occasional trade with officials or padres in remote Californian anchorages added more pelts. Illegal or not, trade between Spanish and Americans continued—after all, the Americans were offering three to six times the Spanish price for each otter pelt.

Though some Spanish officials bitterly denounced the Yankees, a stream of pelts flowed back to Alaska, to the delight of Baranov. The Americans even sent Aleut hunters right into San Francisco Bay where there was a vast otter population. The enraged Spanish killed some of the hunters, but many loads of fine skins were paddled back to the mother ships.

The Spanish failed to do much hunting themselves, but successfully policed the Russians when they tried hunting without the Americans. Offers and appeals by Russia were turned down. Russians established Fort Ross, 65 miles northwest of San Francisco, and sent hunters out from there. But hostile Indians met the Aleuts to the north, and the Spanish seized them to the south. Moreover, the otters were beginning to get scarcer.

Mexican independence relieved the Russians of their chafing restrictions, for the Mexicans gave permission to hunters in return for a 50 percent commission. Thus 1,053 skins were taken, mostly from San Francisco Bay, in 1824.

Buckshot reaps a heavy harvest

But the fur business wasn't what it had been. Otters were not as plentiful, and changing methods of hunting decreased their numbers further. Large armed ships, *contrabandistas,* carried hunters and their kayaks into Mexican waters—without paying any 50 percent commission—where they blasted away with buckshot from English muskets. One took 300 sea otters in just two months in 1831. Two years later a hunter lamented that he "took but 32 from San Francisco to Monterey."

Veteran beaver trappers from the United States found it easy to become Mexican citizens and hunt sea otters. They used rifles from shore, employing Hawaiians to swim after the carcasses. Sometimes a rifleman worked from the prow of a specially built small boat.

Hunters persisted in the declining business until 1848. Then most were delighted to abandon wages which had fallen below $16 a month for a chance at the gold fields. Yet the sea otter business, along with the hide and tallow trade and the visits of Yankee whalers, was largely the reason that California was acquired by the United States.

The animals also had a part in our acquisition of Alaska from Russia. As hunting played out and profits from sea otter pelts diminished, Russians lost interest in a great territory that seemed just a cold wilderness except for its fur wealth. They were, then, receptive to offers from the United States to take Alaska off their hands. In 1867, Secretary of State William Seward bought Alaska for $7.2 million—too much to pay, it was hotly argued by the skeptics, for "Seward's Folly."

By the turn of the 20th century, only an occasional otter was seen (and shot) along the California coast. In 1911, when few pelts were taken on the entire Pacific coast, Russia, Japan, Canada and the United States at last agreed to stop killing the animals. California later passed a state law which levies a fine of $1,000 and a sentence of a year in jail for even possessing an otter pelt.

What happened to save these hard-pressed animals

from extinction? Adele Ogden, writing on the sea otter in 1941, suggested that "some of the long, lonely stretches of the California coast have served as quiet havens where a few of this rare species have been able to live their natural life. . . ." Dr. Harold Heath, after confirming the exciting evidence of their return in 1938, said: "I believe the animals . . . have been propagating in the seclusion of the isolated coastal region and by mere chance came north far enough to be observed."

The sea otter's comeback has caused grumblings in the ranks of California's abalone interests, for the animal is an expert at diving for these mollusks and wrenching them off the sea floor. Yet abalone, which many argue have been overharvested by man, can be raised in artificial beds, and, moreover, they are by no means the sole staple of the otter's diet.

A feeding otter dives for sea urchins, black mussels, abalone, kelp crabs, kelp worms—it eats 25 different food items in all. It often surfaces with a rock which it places on its chest, pounding shells open against it while it floats on its back, then eating the meat. From shore you can hear a distinct cracking sound as it knocks a shell apart. A couple of gulls are often circling the diner for scraps, and you can sometimes spot an otter far away by noticing the action of the birds.

Sea otters usually feed immediately outside breakers and are marvelously graceful and agile in avoiding destruction on the rocks. They may take four or five dives to get what they're after, staying down about 35 seconds each time.

Though abalone interests may decry the return of the animals, another threat now is probably from the oil that pollutes so much of their habitat. Oil makes the fine fibers of their fur stick together, destroying the air pockets that keep the animals warm and buoyant. An extensive oil spill could have a devastating effect on them.

Sea otters usually float among kelp beds in shallow shoreline areas. They congregate in herds of several dozen or more, out beyond the breakers, to sleep and socialize. Sometimes they drape a strand of kelp over their bodies to keep from drifting away from the group, then doze off, resting their forepaws over their eyes to keep out the sunlight.

Tracks reveal their clumsy walk

Dozens of observers have commented on their clumsy walk when they go ashore during storms and at other times. Their tracks can be seen on the sand along rocky shores. This occurs more among the Alaskan otters and, though I have watched perhaps 100 of the animals along their present California range

Head sleek from diving, a sea otter dines on red rock crab. The animals swim through kelp "forests," hunting any available shellfish. They munch down sea urchins, despite the spines.

between Monterey and Santa Barbara, I confess I have not yet seen one on land. Perhaps they were once less frightened of man.

Until you have seen one, a sea otter is difficult to find, for they're easily confused with kelp. But except when they rest—often a half mile from shore—they are always in motion, swimming along, whereas the kelp simply bobs up and down.

Like most marine mammals, a female sea otter bears only a single pup at a time. It rides on its mother's chest while she swims on her back. She gives it constant and devoted care and exhibits almost human solicitude, fondling it with her dexterous forepaws, leaving it only to dive for food. If the youngster gets separated from its mother, she becomes frantic, swimming around screaming for it. The pup stays with its mother for about 15 months, frequently nursing while it gradually learns the tricky business of diving for food.

In their kelp beds, two otters often tumble over one another, uttering hoarse, catlike cries. Biologist Karl Kenyon reports that the animals are easily tamed when lured with fish scraps. He wrote that a female "readily took food from our hands, never offering to bite with her strong canine teeth." Yet they have generally done poorly in captivity.

They are possessed with a vast curiosity, half rising in the water to investigate a commotion on shore. It's a trait that was almost their undoing, for it brought them within the range of man.

Sea otter is one of nature's few tool-users.
It dives for rocks with which to break abalone

or mussels loose from the bottom. Surfacing,
like this one, it cracks shells against the stones.

By Meryle Secrest

A 'thief of souls': portraits by Romaine Brooks

Works of an American artist little known in this country are being shown at the National Collection of Fine Arts

"As I greeted my mother in London," Romaine Brooks, then aged 12, recalled, "and recognized the same mad, luminous eyes and unsmiling mouth, I felt the apprehension of a small animal caught in a net and for no good reason of its own.

"I was dressed in a sailor suit [after four years spent in a boarding school in New Jersey] with a diminutive bustle that I hated and a high, starched collar that choked me.

"After a slight inspection my mother addressed me as one would a grown-up person: 'A bustle, a standing collar and an American accent are inappropriate here.' "

This extract is from the unpublished memoirs of an American artist who is having her first exhibition in more than 30 years in Washington this month. The National Collection of Fine Arts, one of the Smithsonian museums, has on display 31 paintings—almost all portraits—along with 37 drawings, some photographs and personal scrapbooks. The NCFA owns all but nine of the oils. The others are on loan from Yale University and from the Petit Palais, the Musée d'Art Moderne and private collections in Paris. The exhibition closes on April 3.

Romaine Brooks is a curiously interesting and neglected artist who died in Nice, at the age of 96, only last December. She is scarcely known in the United States; her work has not been seen here since an exhibition of her drawings in Chicago in 1935.

Every artist's emotional life has some bearing on his work, but in the case of Romaine Brooks her art was so much an expression of her state of mind, vividly intensified, that understanding it is central to an appreciation of her work. Her memoirs, which the NCFA owns, provide all the clues. They demonstrate why she became so aware of emotional tensions and could paint them with such insight. They spell out, sometimes with great pathos, the dark and terrifying forces against which she struggled all her life.

The circumstances of her early years are improbable enough for a Gothic novel. She was the third child of Major Harry Goddard, whose only claim to distinction appears to be that he was descended from Napoleon; he left home before Romaine was born. Her mother was Ella Waterman Goddard, heiress to a Pennsylvania coal-mining fortune. There were two older children, a mentally disturbed boy of seven whom her mother had named St. Mar and a girl, Maya, who is never mentioned in the memoirs.

Romaine was born in Rome in 1874, where her mother happened to be traveling at the time. She was always traveling, taking with her the children, a retinue of doctors and servants, and 22 trunks. Occasionally she would settle down in one place for a while, buying houses and chateaux as erratically as the wigs she constantly wore. She owned no less than six apartments in Nice alone.

Being the whipping boy

In the midst of such luxury, Romaine lived the emotionally starved existence of the unwanted child. She said many years later: "My mother didn't want me. That's a perfectly natural thing—a lot of people don't like children—but she hated that I was bright and that my brother was demented. I was the *souffre-douleur*—the whipping boy."

By the time St. Mar reached puberty he was clearly insane, but his mother refused to acknowledge it. She insisted that he be treated as normal, and when she discovered that Romaine was the only person who could influence him, Romaine was made his keeper.

In his crazy fashion, he was nevertheless the only protection the girl could hope to find. On occasion, when her mother's mad mood was seeking a victim, he would intervene on Romaine's behalf. These interventions were so unexpected that from mere astonishment her mother instantly calmed down (page 44).

But the battle lines between mother and daughter had been drawn at an early age. Some years before the period of which she writes, when Romaine was only

Meryle Secrest writes on cultural matters for the Washington Post *and interviewed Lord Clark for the November issue of* SMITHSONIAN.

Ida Rubinstein, oil, 1917. The Russian-born dancer became Romaine Brooks' ideal of feminine beauty.

All paintings: National Collection of Fine Arts

six, her mother apparently attempted to abandon her. They had been living in New York. Making one of her sudden decisions to depart for Europe, Mrs. Goddard deposited Romaine—along with a pile of dirty laundry—with her washerwoman and sailed off. The little girl lived in a New York tenement on a diet of black coffee, bread and pancakes; when the promised weekly stipends for her care stopped coming, Mrs. Hickey, the laundress, put her to hawking newspapers on the street. Curiously enough, she wasn't unhappy because Mrs. Hickey let Romaine draw as much as she liked, something her mother had not permitted.

Within a year she was rescued by a secretary of her grandfather Waterman and was sent to an Episcopalian boarding school in New Jersey. It was after four

Renata Borgatti au piano, oil, c. 1920. The subject of this intense portrait was an Italian pianist.

years there that she arrived in London, to be met with her mother's disapproval. Among other things, her mother, who dabbled in spiritualism, objected to the fact that the school had confirmed Romaine as an Episcopalian; she dispatched her daughter first to a bleak convent in northern Italy and then to a Swiss finishing school.

As she grew older, Romaine managed to keep the hold on her sanity that only an exceptionally perceptive and strong-willed person could have done. But the price was high. She began to identify herself with *les lapidés,* "the stoned ones," the outcasts. She knew that fate had made her a victim, and she made it a badge of pride that she did not break. "It made me strong," she said years later.

She saw herself as alienated from the world, a solitary "black-cloaked traveler," but she did not understand the internal dynamics that cause the victimized to continue to look for the emotional patterns of his childhood, since those are the only ones he knows. This accounts for the habitual tone of outraged hurt and the aggrieved complaints of her later memoirs. It also led her to avoid society in her later life.

As a young woman, she described herself in the following way: "I had the mentality of a 10-year-old schoolboy, frank and candid to a degree, but with a personal code that made small distinctions between what is generally called vice and virtue. . . ."

There are guarded references from the start to attachments to older girls or teachers at the schools she

Le Trajet (The Crossing), oil, c. 1911. A symbolic painting, but the face and figure are Ida Rubinstein's.

Self Portrait, oil, 1923. The artist painted this unflinching likeness of herself when she was 49.

attended. These were not the usual pre-adolescent crushes. She never outgrew them and, although she was briefly married, her deep emotional involvements were reserved for women.

She always hated the elaborate costumes of the period and eventually abandoned them altogether in favor of short hair, pants, a jacket and a bow tie.

Natalie Barney, the writer who knew her for 50 years, has commented: "She never did anything to put herself in a position of notoriety except for her taste, which was exceptional, and her appearance." She added, "Of course, she was often rude. I don't think that is a virtue, but it takes courage."

Once Romaine Brooks became 18, she managed to wrench herself free from her mother's destructive influence, and succeeded in extracting from her a modest monthly allowance. For a time she tried a professional singing career in operettas, but gave it up in favor of art. She enrolled for a while in the free Scuola Nazionale in Rome, the only girl among hundreds of boys, then studied for a while in Paris and eventually went to Capri, where she lived in an old chapel with a view of the sea from the terrace.

In 1901, while on Capri, she saw in the *Paris Herald* that her brother St. Mar had died. Summoned to Nice, she found her mother haggard, with wisps of gray hair straggling out from under a blonde wig. "Her face," she said later, "which once quivered with madness, was now a rigid mask of despair." With her son dead, Mrs. Goddard lost her reason to live. She died several months later, whispering "But it is so cold, so cold."

Release and recompense

To her surprise, Romaine discovered that under the terms of her grandfather's will she had inherited the Waterman family fortune.

"So from possessing almost nothing," she wrote, "I had now six flats in Nice alone, another in Monte Carlo, one in Dieppe, one unfurnished one in Paris and a chateau near Menton. Also there were trunks and wardrobes filled with clothes, furs, linen and innumerable pieces of old lace, and numerous death masks of my brother, plus gold and silver coins piled in the corners of cupboards."

After her mother died, she fell into a state of profound melancholy. She believed that her mother was haunting her. It was then that she married, apparently out of gratitude, an English writer named John Ellingham Brooks who had befriended her during her days of poverty on Capri. It did not last, although she kept his name. She moved to London and took a house in Chelsea across from that of John Singer Sargent, whom she never met.

She also began a fruitful period of study in Cornwall near St. Ives, "training my eyes to detect and my hands to note down an endless gamut of grays."

She had begun painting portraits on Capri as a way to earn money, but it became a passion for which she prepared with her customary single-mindedness.

About 1905 she moved to Paris, took a spacious apartment on what is now the Avenue du Président Wilson, rented a large studio on the Left Bank and concentrated on painting for the next five years. She wanted nothing except to be left alone, but she was already evolving a distinctive way of life which excited general curiosity.

In those days decorative tastes ran to Louis XV and Louis XVI, styles she detested. She redecorated her apartment in black, gray, beige and white, the colors of her paintings. Soon almost everybody else wanted black furniture, black tiled floors, gray walls and massive bouquets of white flowers. "The effect in 1908 was just as revolutionary as Whistler's white rooms had been in London some years before," says Adelyn

D. Breeskin, curator of contemporary art at the NCFA, who organized the current exhibition and wrote the major essay in the catalog. Romaine Brooks was henceforth in demand as an interior decorator.

Of her taste, Natalie Barney has said: "Even the tiaras she saw at the Opera she was against. She wore a simple platinum band. One day a lady came to see her wearing a bright green dress. 'Go away, go away,' Romaine said. 'My values are subtle, your dress isn't.' "

In 1910, at the age of 36, Romaine Brooks was given her first one-man exhibition at the Galerie Durand-Ruel in Paris. She was a sensation. That supreme esthete, Robert de Montesquiou, called her a *"cambrioleuse d'âmes"* (thief of souls); *Le Figaro's* critic predicted that "these strong and discreet works of surpassing elegance and subtle taste will prove a revelation"; and the poet Apollinaire praised their "sober elegance, pale faces, silhouettes like memories."

Seen from our vantage point, these portraits have a certain Art Nouveau look about them that dates and limits them. They are all very much the same: a motionless figure, posed with one or two objects of significance, making a bold, theatrical mass against a romantic backdrop of clouds or breaking waves.

Everything in these portraits is deliberately contrived, stiff and lifeless except the faces. And this is the source of their continued power. These facial expressions carry such intensity of feeling that they compel the viewer's attention, forcing him to stare at them in an attempt to penetrate the mystery at the core—what Mrs. Breeskin calls "the inner being."

The freedom to choose

In one stroke Romaine Brooks became a brilliant success, courted by hostesses who wanted to show her off or marry her off, and by socialites who wanted her to paint their portraits. But since she could afford it, she was able to pick and choose, and all her portraits are those of friends, or of people whom she thought "paintable" for one reason or another.

The young Jean Cocteau was one of the latter. She painted him, as elongated as a pencil, standing on a balcony before the Eiffel Tower. "Soon, instinctively," she said, "I knew that we moved in diametrically opposite directions; that he was no *'lapidé,'* but rather that he sided with those who threw the stones. I painted him a concave figure standing as it were at the bow of his ship listlessly zigzagging its course."

That first exhibition at Durand-Ruel also led to one of the major friendships of her life. Among those who came to see her paintings was Gabriele d'Annunzio, the Italian poet who had been forced to leave his country, whether for bad debts or because of his many love affairs, or both, is not clear.

She was immediately attracted to him. Letters quoted in Frances Winwar's *Wingless Victory,* a book about D'Annunzio, imply that they might have had a brief, unhappy affair. But in her memoirs Romaine makes no mention of this. Instead, she comments: "He changed the world about me and lifted me from a state of deep despondency."

However the relationship began, it is clear that it developed into a close, permanent and platonic friendship. D'Annunzio wrote poems in honor of her paintings, confided in her completely, told her about his conquests and never put her in his usual category of a woman to be seduced and then abandoned. She probably helped pay off his bad debts and painted two portraits of him, one sad and agonized. "I can accept the mouth but not the eyes," he said when he first saw it. But he later came to accept it all.

Una, Lady Troubridge, oil, 1924. The long-time companion of Radclyffe Hall with her dogs.

If this drawing does not recall a real incident, it does symbolize the relationship between Romaine (center) and her mother, and the fact that her brother (right) sometimes unexpectedly intervened.

Through him, Romaine Brooks met the legendary Ida Rubinstein, a Russian-born dancer for whom the Italian poet had written *The Martyrdom of Saint Sebastian,* which Debussy set to music. Though limited as a dancer, she made a striking effect through the force of her personality and her extraordinary beauty. Romaine described her as being "like some heraldic bird delicately knit together by the finest of bone structure, giving flexibility to curveless lines." They became close friends, and Ida Rubinstein, with her elongated, almost sexless body and her intense, brooding expression, became the artist's ideal of feminine beauty—expressed not only in actual portraits (page 39) but in symbolic works like *Le Trajet* (page 41).

The other major friendship of Romaine Brooks' life was that with Natalie Barney, a gifted and wealthy American woman who had chosen expatriation at an early age. Her Friday afternoons at 20 rue Jacob were famous and attracted the regular attendance of Marcel Proust, Colette, James Joyce and Paul Valéry. She helped launch the career of T. S. Eliot, and Lord Alfred Douglas asked her to marry him (she declined).

She was a formidable figure when Romaine Brooks met her. Despite her increasing reclusiveness, Romaine found herself being drawn back into the social whirl through the force of Natalie's persuasive personality. She said in her memoirs: "But I had never found a real woman friend before and Natalie brought me a wealth of friendship which I gratefully accepted and fully returned. After all, I reflected, the point is not whether she is popular, but that I remain firm in my contempt of popularity."

It was through Miss Barney that Romaine met Radclyffe Hall, author of a dignified plea for the acceptance of homosexual relationships, *The Well of Loneliness,* and her companion, Lady Troubridge. Romaine's portrait of the latter (page 43) is almost a caricature, but a very telling one.

Natalie Barney is indirectly responsible for the current exhibition at the National Collection of Fine Arts. Her mother, Alice Pike Barney, was a prominent and wealthy Washingtonian and dilettante painter whose house on Massachusetts Avenue was given to the Smithsonian nine years ago. Natalie and her sister, Laura Dreyfus-Barney, influenced Romaine's decision to give the NCFA the bulk of her paintings a few years ago, along with the manuscript of her memoirs and other memorabilia.

Although Romaine Brooks and Natalie Barney lived throughout the entire course of World War II in a villa near Florence, her memoirs indicate that the later years of her life were spent in comparative tranquility and obscurity. By the end of the war she had stopped painting because of eye trouble, although she did execute one last portrait, of the Florentine Duke Uberto Strozzi, in 1961, when she was 87.

She never sought psychoanalysis, but what she did do was almost as useful. She wrote about her experiences, and she drew them—in a series of brilliant drawings, of which the NCFA has only about a third. They are swift, lean and psychologically astute, in a style that is a marriage of James Thurber's spare and ironic line with the symbolism of William Blake.

The titles of some of these drawings speak for themselves: "The Idiot and the Angel," "Master Pig," "Equilibrium—Death's Toy," "Caught," "Climbing One's Wings," "We Weep and We Weep Alone."

In the catalog, Mrs. Breeskin writes: "They suggest and symbolize more than they define. Yet they are always disciplined. The artist has mentioned that as she poised her pencil over the paper she had no idea what would evolve. As if hypnotized by the very act of drawing she summoned up aspects of her past life, the better to understand the nature of human fear and loneliness."

From a tormented childhood to a tranquil old age, Romaine Brooks might have written her own epitaph when she said: "We leap into dangerous waters. Lucky is he who, with the return of a wave, is landed higher than he was before."

La Baronne Emile d'Erlanger, oil, c. 1924. The cat was given the features of the baroness' husband.

By Paul E. Desautels

For a little bit of data, you need a big machine

To extract information from tiny pieces of mineral, the Smithsonian's 'probe' goes through some complex electronic calisthenics

There was a time in the history of the physical sciences when there existed an abundance of available facts not yet stitched into theory. The mental effort required was prodigious but, with rather simple laboratory procedures and primitive instruments, great discoveries could be made.

Science has changed. It is profoundly difficult to formulate the remaining undiscovered laws basic to the operation of the material universe. Even the supporting facts themselves can be accumulated only with great difficulty. Often, the laboratory instruments required for collecting facts are ingeniously designed, marvelously successful but frustratingly complicated and discouragingly expensive. A typical member of this breed of science-support instrumentation is the Electron Microprobe X-ray Analyzer that has been in operation for six years in the Smithsonian's National Museum of Natural History.

The advantage of this formidably named instrument is its ability to supply dependable chemical analyses of very tiny samples. Often, in rock studies, the individual grains making up a rock are much too small to separate into reliably pure samples of adequate bulk for traditional "wet" chemical analysis. The "probe" is capable of analyzing each such grain without even destroying the original sample.

Surprisingly, the name of the instrument describes both its mode of operation and its function. Henry Moseley is responsible for its basic operational premise. He was an English physicist, perhaps best remembered for his work, published in 1913 and 1914, establishing the relationship between the atomic numbers of elements and the frequencies of x rays given off when their atoms are bombarded with cathode rays. Quite simply, the frequencies of x rays given off by excited atoms are a direct key to identifying which elements they represent. The probe excites atoms into emitting x rays, collects the x rays, sorts out and records the kinds and quantities of each. In short, it acts

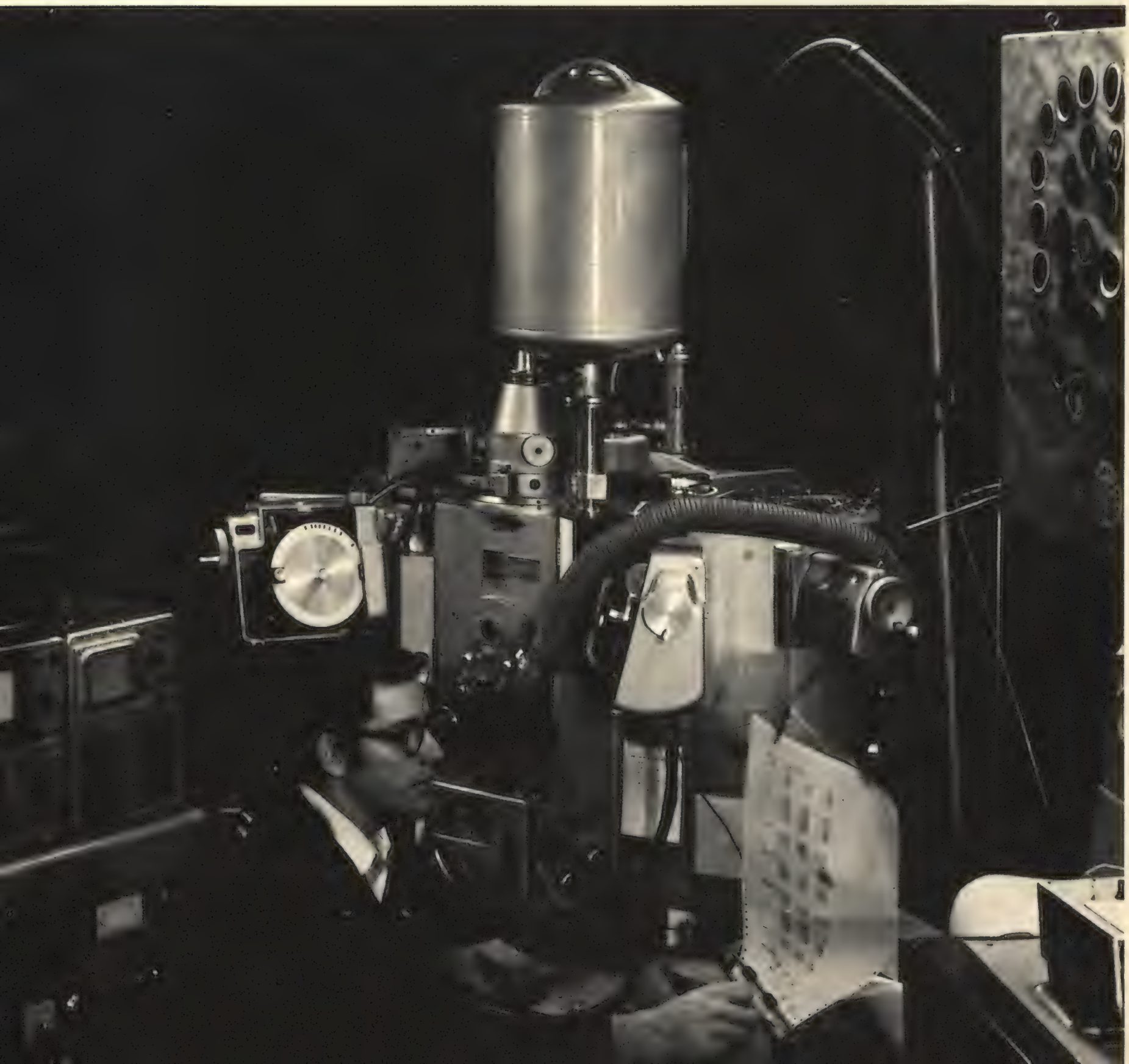
Alert for any suspicious wheeze or thump in the complex "probe," Charles Obermeyer studies results printed out by its automatic typewriter.

the part of analytical chemist and produces a chemical analysis electronically.

At the heart of this electronic marvel is an electron gun which shoots out a stream of potent, high-energy electrons toward a mineral sample (the target) only a couple of feet below. On the way, the electron beam is tightly focused by a magnetic condenser lens so that, when it hits the target, it is less than one micron in diameter—less than one twenty-five-thousandth of an inch. The gun, focusing chamber and sample target are kept almost air free under a high vacuum to permit focusing and to prevent scattering of the electron beam and loss of intensity of the x rays that are to be detected and recorded.

The sample to be analyzed, such as a tiny piece of rock or mineral, is mounted in a Bakelite or epoxy resin holder and carefully polished to a clean, flat, mirror-surface perfection. A transparently thin coating of carbon is applied to the surface to make it electrically conductive. Then the sample is safely entombed in the vacuum chamber, ready for electron bombardment. But unfortunately the analyst has to see the sample to be certain that the beam strikes the correct spot. So the instrument is further complicated by an optical microscope system, along with other sample chamber accessories: a mechanical stage system to move the sample around and an electronic system to steer the electron beam where it is needed.

Now, the scene is set for action. The vacuum is holding, the sample is correctly positioned, the electron



You need a big machine

beam is focused on a selected spot on the sample and a variety of characteristic x rays is being produced by the different kinds of atoms under attack.

The next task is to sort out the various x rays in order to determine the kinds and amounts of the various atoms present in the sample. This is accomplished by spectrometers located in the head of the instrument. At the heart of the most efficient type of spectrometer is a crystal—called a Johannson type—that has been bent and ground to a carefully measured curve.

Selecting the proper crystal

All crystals operate according to a law formulated by W. L. Bragg in 1912. The law requires that for a given kind of crystal and a given x-ray wavelength there is only one angle to the x-ray beam at which the crystal can be set in order for that particular wavelength to be deflected (or *diffracted,* to be technically correct). Thus it is a matter of selecting the proper crystal and setting it at the appropriate angle to diffract x rays characteristic of some atom, say calcium. Instantly, these and only these x rays will be separated from the group and focused on a device called a detector which counts them.

The detectors used most frequently in probes are proportional counters—gas-filled, metal tubes sealed at one spot by a small window of some material (such as beryllium, mica or cellulose nitrate) which is highly transparent to x rays. By attached circuits a measured voltage is applied to the tube but no electric current will flow because the gas is non-conductive. But x rays, streaming from the spectrometer through the tube window, strike the gas and convert it to a conductor so that a brief pulse of current flows through the tube. A typical counter can count tens of thousands of such pulses per second. The exceedingly small flow of current in each tube pulse is amplified, and amplified again, to be fed finally as part of a strong, rapid series of electric pulses or counts to any one of a number of attached devices which will record it for the operator.

One means of recording is a set of scalers—panels of illuminated numbers which change rapidly as the count increases. At any moment the operator can stop the count and note the number on the scaler or he can push a button and have the count recorded on paper by the automatic typewriter.

The analyst may want a general survey of the entire sample, rather than information about some particular spot. If so, he can cause the electron beam to scan rapidly over the surface and record the count as a glow of varying intensity on the television-like screen of an oscilloscope. With a photographic attachment, he can take a picture of the screen with its maps of the sample. Whenever his selected element occurs, the map will glow brightly but where there is little or none it will be dark (see illustrations).

Connected to the Smithsonian's probe there is also a direct feed to a magnetic tape or punch cards for computer analysis. Probe data calculation is rather complex because it includes so many corrections for errors inherent in the system. Computer support is therefore an essential service.

An Electron Microprobe X-ray Analyzer was added to the Smithsonian's Department of Mineral Sciences in 1964. Grant assistance came from the National Aeronautics and Space Administration, for meteorite research looking toward the recovery of rock samples from the moon. Under the direction of Dr. Kurt Fredriksson, already knowledgeable and experienced with the instrument, the Smithsonian's probe laboratory was established and functioning by the time the first moon rocks had been retrieved. By then, successful probe work had already been done in the department describing the constitution of certain meteorites.

Meteorites and moon rocks

As anticipated, the probe proved indispensable in the study of moon rocks when they finally arrived. Led by Dr. Brian Mason, chairman of the department, and Dr. Fredriksson, and with the assistance of Dr. William Melson, Dr. Joseph Nelen and others, precise descriptions of the composition and constitution of these samples were completed.

Naturally, all those in the Mineral Sciences Department and others with difficult mineral analyses to do turned quickly to the probe for help. Trained by Dr.

The author is supervisor and curator of the Smithsonian's Division of Mineralogy. He is currently at work on a book on gemstones.

Fredriksson and assisted by Charles Obermeyer, the department's ingenious electronics technician who knows the probe's every wheeze, whir, thump and click, they keep the probe in almost continuous use. And the probe keeps them supplied with ample information to chew on (although Mr. Obermeyer is sometimes hard-pressed to keep ailing and aging parts stitched together into a trouble-free assemblage).

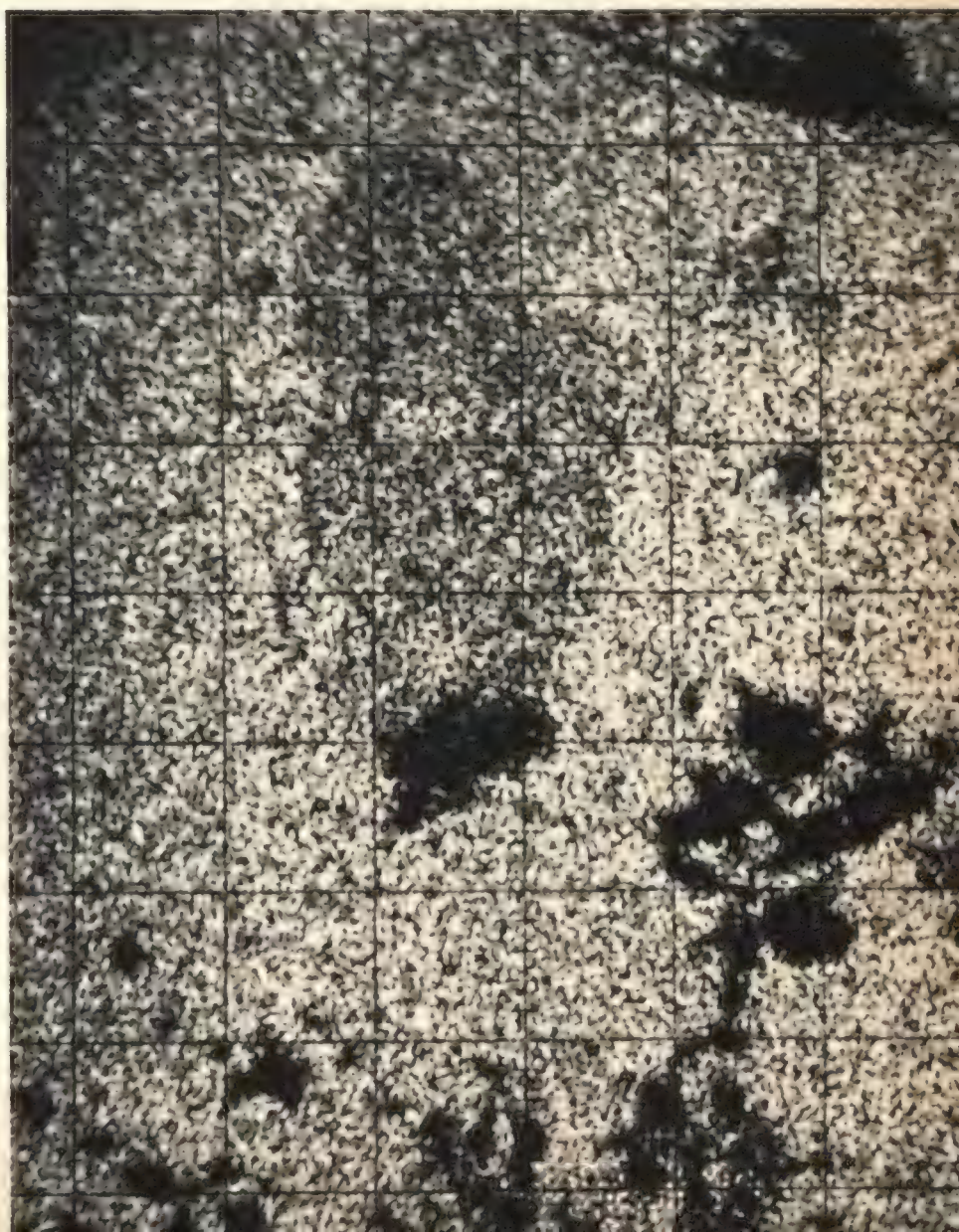
Typical of these other projects is Dr. Melson's study of samples from St. Paul's Rocks—small, bare, rock exposures that lie on the central part of the Middle-Atlantic Ridge. It is suspected that the rocks of this island are actually an exposure of the rock mantle which underlies the floor of the Atlantic Ocean. If this could only be shown to be true, it would be evident that the rock exposure had been laid open because of sea-floor spreading. Probe analysis has proved the presence of many kinds of unexpected minerals such as scapolite, allanite, zircon and several high-chlorine bearing minerals. All of these are quite rare to ocean basin rocks and the results suggest that there is a much wider variety of minerals in the mantle of the earth than had been speculated. Dr. Melson has also used the probe to assist in his work with volcanoes. The lavas are often glassy or very fine grained, making separations into pure constituents for wet analysis impossible. The probe to the rescue!

The versatile analyst

Dr. George Switzer faced the same problems in his study of a series of deep-seated rocks, called kyanite-eclogite rocks, which had been carried up toward the surface during the formation of the famous diamond-bearing volcanic pipes of South Africa. They contained certain melted phases and fine-grained material that defied pure separation. Again, the probe was the answer. The probe's versatility and its applicability to difficult analyses is well illustrated by some research work Dr. Switzer has done with zoned garnets. These and other species of minerals undergo changes in composition during the growth of their crystals. Often, too, they sweep up various kinds of impurities as they grow. These changes in composition and the placement of impurities are found in definite zones related to the structure of the crystal. Ordinary chemical analyses can give an overall composition for the garnet but the probe can map out the variations and show exactly where the changing zones are located.

Examples abound of the probe's uses. It has become an increasingly popular instrument for analytical work not only in the earth sciences, but in biology, archaeology, metallurgy, solid state physics—in short, any of the material sciences. Obviously, however, it is not what might be called a simple laboratory device.

In a tiny piece of the Vigarono meteorite, the probe found a concentrate of titanium (above), glowing on a photograph of the oscilloscope screen. See the same area (below) which was scanned for calcium.



In smocks and sabots, workers drag cannon to Montmartre, defying regular troops sent to seize them. Struggle for guns solidified the revolutionary spirit of the Communards.

By Joseph Barry

Paris Commune: from a dream to bloody nightmare in ten weeks

Many parades will honor workers who, 100 years ago, tried to rule the city to the vast interest of Marx and Engels

East and West, in Paris, Berlin, Moscow, Tokyo and Peking, observances are planned this spring; in London, a ceremony at Karl Marx's grave—all in commemoration of the 100th anniversary of the Paris Commune of 1871. In France, the memory is kept alive by an annual pilgrimage with red flags to the wall in the Père-Lachaise cemetery where 147 Communards were lined up and shot down. In 1964, three Soviet cosmonauts took with them into space a ribbon from a red Communard flag. In the United States, students who occupied Columbia University in 1968 called the buildings "communes."

Myth, legend, warning or lesson, what was the Paris Commune of 1871?

Its story begins with the Franco-Prussian War of 1870 and the siege of Paris. The drama of French history is such that one wonders why the French ever engage in fiction.

Cleverly, Bismarck, the famous German chancellor, maneuvered French Emperor Louis-Napoleon into declaring war on Germany. A good war, said his Empress Eugénie, would save the Empire. From Washington, the new French ambassador warned his countrymen: "You will not reach Germany; you will be crushed in France. Believe me, I know the Prussians." And he killed himself.

Outmanned and outgunned—the Prussians had new long-range, breech-loading cannon made by Krupp—Louis-Napoleon's Imperial Army took the field, and a beating. The Emperor rode in personal command and in constant pain; he suffered from a bladder stone the size of a pigeon's egg.

The first French defeats led to an abortive uprising in Paris, for France was ever the laboratory of revolutionary theory and practice. It remained so, even against the background of conspicuous Second Empire prosperity (there was a rubber newspaper for ladies and gentlemen to read in their baths) and unhidden poverty (a common object in pawnshops was the worker's family mattress).

At the Battle of Sedan, the French Emperor, rouged so his men would not see his ghastly pallor, sought injury or death and found only defeat and disgrace. With 80,000 of his troops, he was captured. His Empire fell, the Third Republic was declared, Empress Eugénie was smuggled out of Paris by her handsome American dentist and Paris celebrated.

Crowds sang and hung red crepe from lampposts. Revolutionaries raced moderate republicans to the Hôtel de Ville, Paris' city hall, from which French republics were traditionally proclaimed. The left-wingers were already forming a government when the Right arrived. A compromise was proposed, consisting of Paris deputies, and the crowds outside roared their approval. General Louis-Jules Trochu, battle-tested and popular, became head of the government, and young Léon Gambetta, a well-known leftist, was Minister of the Interior. Under Gambetta the citizen's National Guard rapidly swelled to 360,000 men. Famous French political exiles, among them Victor Hugo, headed for home.

But the war with Germany went on, and enemy armies laid siege to Paris, expecting it to fall like a

Former Paris Bureau Chief for the Sunday New York Times, *Joseph Barry lives in Paris, writing books on France.*

Gustave Flourens, flamboyant leftist, leads National Guardsmen (with a Commune flag) to protest inaction against besieging Prussians.

ripe, if shrunken plum. Behind its encircling wall, ten feet wide and 30 feet high, and its chain of 14 powerful forts, Paris stuck it out. When communications were cut, the first of many balloons floated over the heads of the astonished besiegers. On October 7, one balloon carried a nervous but determined Gambetta (his hand grazed by a Prussian bullet) toward Tours to try to organize the relief of the French capital.

There had been some haphazard preparations for the siege. Sheep roamed everywhere in the city's parks and squares—250,000 of them in the Bois de Boulogne along with 40,000 oxen—but there were no milk cows. Rationing was mostly accomplished by high prices and endless queues. Men in the National Guard received 1.50 francs a day (about 30 cents). Soon that would scarcely buy a single rat, much less a cat or a decent slice of horsemeat or a slice of Castor and Pollux, the zoo's butchered elephants.

Pressure on the Paris government increased. When news of the fall of Metz coincided with reports of negotiations for an armistice, crowds again exploded around the Hôtel de Ville; National Guardsmen, their rifle butts uppermost to show their sympathy with the mob, marched and demonstrated. Elections were demanded, and cries were heard for the government's resignation, and also *"Vive la Commune!"*

The German leaders looked on without displeasure from the palace of Versailles where they had settled themselves. Early in the new year of 1871 the first shell from a Krupp gun struck Paris. On January 18, to the background of German gunfire and cheers, a united German Empire was solemnly proclaimed in Versailles' Hall of Mirrors—where, by no coincidence, a defeated Germany would be obliged to face another ceremony 48 years later.

Armistice talks continued between Bismarck and Jules Favre, Minister of Foreign Affairs. Bismarck: "You have grown grayer." Favre, discussing terms: "I cannot, at any price, have the National Guard disarmed." Bismarck, cynically: "Provoke an uprising then, while you still have an army to suppress it with." The armistice agreed upon, Paris reacted with enraged amazement and Gambetta resigned in fury. But the siege was lifted; Paris ate. And on February 8, France went to the polls.

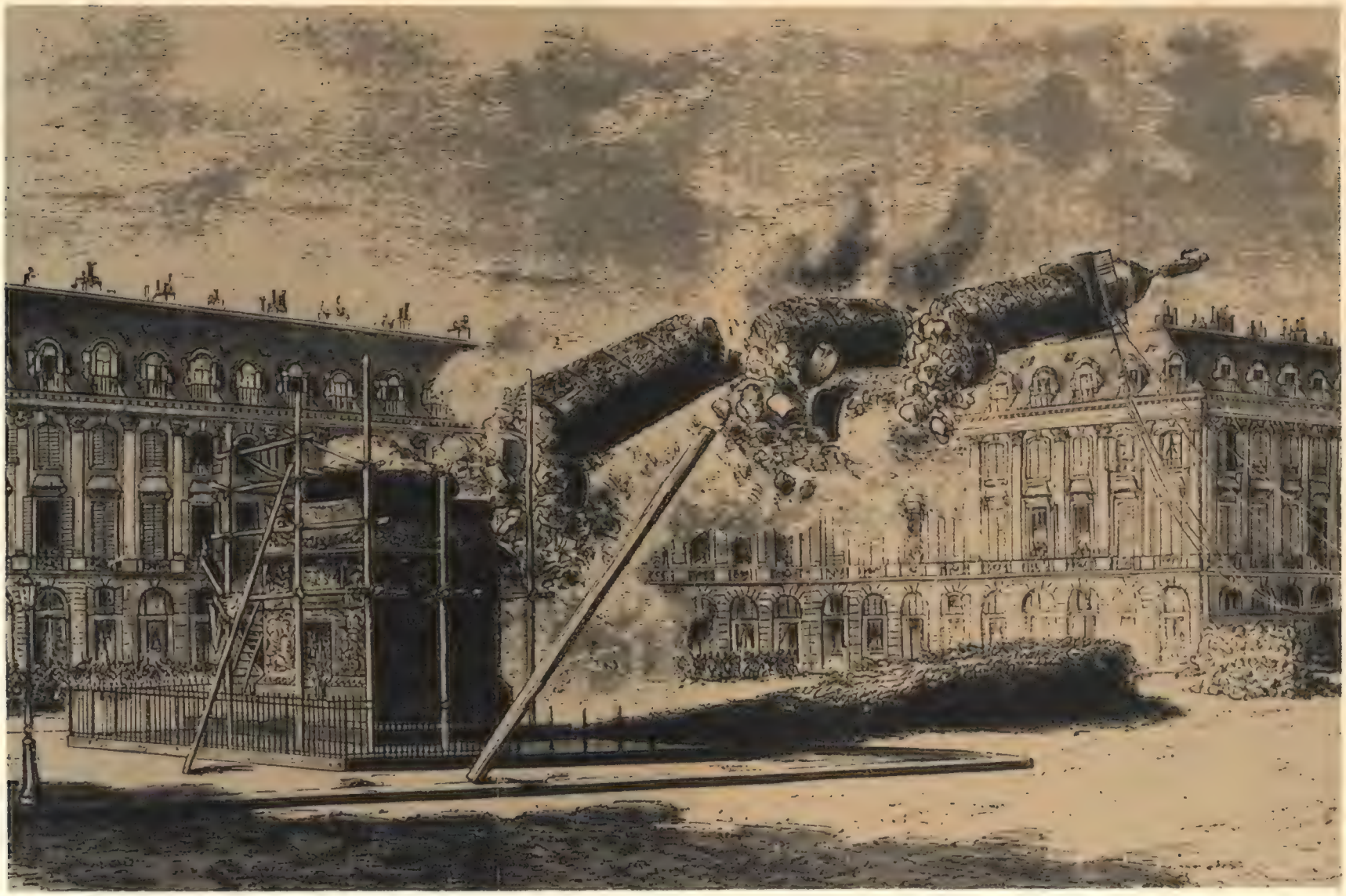
Out of 768 seats (a bare 43 for Paris), only 150 deputies favoring the Republic were returned. The majority was conservative, even monarchist, and a scorned—and scornful—Paris called it the assembly of rurals. Diminutive 73-year-old Adolphe Thiers, an ultra-conservative, was made the Assembly's Chief of the Executive Power. To Thiers, the people were "that vile multitude." To Karl Marx, Thiers was "that monstrous gnome." As head of state, Thiers concluded a peace treaty at the cost of Alsace and Lorraine, a German victory march in Paris and an indemnity of five billion francs, or one billion dollars. The Assembly ratified the treaty, and extreme leftist deputies resigned. Paris no longer felt itself represented.

Thiers moved swiftly and foolishly. He lifted the moratorium on debts, antagonizing the petty bourgeoisie. He ended the modest pay of National Guardsmen, transforming them into angry unemployed. He sentenced to death certain leftist leaders (if they could be found), infuriating the revolutionary proletariat. He then adjourned the Assembly, to meet thereafter in Versailles, further alienating the Parisians.

Streets fumigated after German parade

On March 1, German Uhlans, Saxons and Bavarians marched on the Champs Élysées and were greeted with silence and black-draped streets. National Guardsmen fumigated the area of the victory parade after the Germans departed to the north and east of Paris, pending war claims payments.

On the night of March 17-18, Thiers moved for his showdown with the National Guard. Refusing to surrender their heavy cannon (theirs by popular subscription), the Guardsmen had dragged the guns to the heights of Montmartre for safekeeping. Thiers sent



Vendôme column, deemed an imperial symbol with its statue of Napoleon I, crashes down as Communards cheer the spectacle and the omen.

12,000 to 15,000 Regulars to seize the guns. ". . . It is necessary, at all costs," he proclaimed, "that order . . . should be reborn."

Caught by surprise, the handful of Guardsmen on watch were captured or put to flight. By 4 a.m. all seemed to be over. However, Montmartre's "Vigilance Committee" was alerted. The tocsins sounded throughout Paris. People and National Guardsmen hastened to Montmartre, surrounded the Regulars, threatened and cajoled them, and separated them from the guns. General Claude Lecomte, commanding the Regulars, and conservative General Clément Thomas, recognized in civilian clothes, fell victim to the crowds and, later that day, were shot. Their killing spurred cries for vengeance in the Assembly. The young mayor of Montmartre, who had hoped to negotiate the surrender of the cannon, wept at the futile deaths. His name was Georges Clemenceau, and he did not weep again until the Allied victory of 1918.

Down from Montmartre swept citizens, Guardsmen and defecting Regulars, to surround the Hôtel de Ville. Safe for the moment in the Foreign Office, Thiers chose to move his government immediately to Versailles. He fled Paris, followed by a ragged column of jeered Regulars. That night a red flag hung from the bell tower of the Hôtel de Ville, and a surprised, slightly embarrassed Central Committee consisting of elected officers of the National Guard found itself in power in Paris.

There had been no plan for insurrection. There was no plan for holding power. There was not even any pursuit of demoralized government forces. "We have no mandate save the assurance of Paris' rights," declared the Central Committee. "If the provinces think as we, they will imitate us."

Uprisings flared in Marseilles, Toulouse, Narbonne, Saint-Étienne, Le Creusot and Lyons, lasting two, or, at the most, ten days. Meanwhile the Central Committee announced elections for March 26 and occupied principal ministries. But it did not take over the Bank of France.

"The proletariat stopped half-way . . . instead of annihilating its enemies, it endeavored to exercise moral influence on them." The writer: Lenin. Fried-

In a typical skirmish, Parisians clash with regular troops at the Place Pigalle. Many soldiers upend rifles to signify sympathy with the people.

rich Engels, co-founder, with Marx, of modern communism, later noted: "The hardest thing to understand is certainly the holy awe with which they remained standing respectfully outside the gates of the Bank of France."

Not only did the proletariat leave the bank alone, the Central Committee borrowed, eventually, a few million francs from it. The Versailles government winked at this transaction—a sort of hedging the bet—and itself borrowed several millions more. The Bourse, the Paris stock exchange, also remained untouched, and remarkably steady.

Judges, magistrates and police officials, most of whom had fled to Versailles, were replaced by means of elections. Seldom had Paris experienced such cheerful order. "Robberies, assaults and other crimes," recalled an English physician, "became a very rare occurrence." The moratorium on rents and debts was reestablished; furniture, bed linen, workers' tools were freely redeemed from pawnshops. Freedom of the press was decreed; it did not last long.

Two days after the March 26 elections, the Commune was proclaimed from the Hôtel de Ville as thousands massed on the square and sang the Marseillaise. The Communards were not communists. Years before the *Communist Manifesto,* communes existed in France as a form of local self-government. However, the Commune of 1871 sounded a prophetic note of decentralization and community control.

Perhaps a third of the some 80 officials of the Commune were former workers and artisans. Almost all considered themselves spokesmen. Typically, one Communard's wife continued to wash her husband's shirts in a *lavoir* of the Seine.

Thiers more profitably used the time granted him by massing a formidable professional force of 170,000 men. He turned down efforts by the mayors of Paris and later by the Freemasons for conciliation with the Commune. "We do not negotiate with assassins," he reportedly said.

On April 2, his force of *Versaillais* struck at a western suburb, seizing it and shooting the prisoners taken. The Commune had managed to postpone civil war while it also looked anxiously over its shoulder at the Germans massed to the north and east. But now war had begun.

The following morning three columns of Communards made a counter sortie, but panicked under artillery fire. One commander pushed on until he was virtually alone. He rested that night in a village inn, then was betrayed to a Versailles cavalry colonel who split his skull in two with a saber. Another officer, in a column of Communard captives, stepped forward when asked who was their leader. According to one account, his captor then inquired: "If I were your prisoner, what would you do to me?"

"I would have you shot."

"Good. You have just passed your own sentence."

In reprisal for such arbitrary justice, the Commune ordered hostages taken, with three to be shot for every Communard so treated. The dreadful decree was not applied, except that hostages were rounded up—including the Archbishop of Paris.

Thiers built his army, while incompetent leadership plagued the Commune. On Palm Sunday, Thiers ordered the shelling of Paris' suburbs, and more shells eventually fell on Paris itself from French guns than had been fired on the besieged city by the Prussians.

Paris had spirit but not organization. The National Guardsmen were enthusiastic but untrained. The women who fought beside them in bloomers were as fierce as they were courageous. From London, Karl Marx sent a family friend, Elizabeth Dimitrieff, illegitimate daughter of a Czarist officer, to help organize a *Union des Femmes*—and to act as his private reporter on Paris events.

"These people," observed youthful Louis Rossel, who finally took over as a capable commander, "have good reason for fighting, they fight that their children may be less puny, less scrofulous, and less full of failings than themselves."

Even as they fought, the Communards initiated the reforms which would become part of their legend. The elected officers of the National Guard could be demoted at any time. Administration officials were also subject to recall.

Poet Paul Verlaine became the Commune's press officer. Painter Gustave Courbet was made head of the Beaux-Arts commission. Under his impulsion the column on the Place Vendôme with the statue of Napoleon at its top was pulled down with great ceremony as the symbol of "militarism and false glory," never again to appear. (Courbet would spend the rest of his life in Switzerland to avoid paying for its restoration.) In the same generous spirit, the guillotine had been burned.

Church was separated from State; priests were to be paid by their congregations, not by the government. Public education was to be made free, lay and obligatory. Night work was abolished for bakeshops. Idle, deserted factories were to be turned over to workers' associations. But the latter decree was to remain a dead issue—as the Commune itself died.

Forts begin to fall

The forts ringing Paris were falling to Thiers' Regulars. In desperation, the Commune turned to a dictatorial Committee of Public Safety. Socialists and Internationalists were opposed in the name of democracy but finally went along. More forts fell, and in angry, inept response to the bombardment of Paris, Thiers' own house was ordered demolished.

More gravely, when a great munitions factory exploded, sabotage was suspected and the lives of the hostages, augmented by dozens of priests, were menaced by the Communards.

Thiers was free to proceed with his own crushing plans as the Parisians, under shellfire and siege, built barricades and earthworks in the streets and incongruously feted their Commune at public concerts.

Finally, on Sunday, May 21, Versailles' forces poured through a strangely unguarded western gate, and the seven days indelibly recorded as "The Week of Blood" commenced. The Trocadéro hill was taken, then the Arc de Triomphe, its guns sweeping the Champs Élysées. Commune leaders called for the burning of the Seine bridges, for a scorched Paris. Old Louis Charles Delescluze, acting commander of the Communards, ordered a street-by-street fight "with bare hands" if there were no arms, and himself left the Hôtel de Ville for the barricades.

Cautiously, methodically, one column of *Versaillais* worked along the Left Bank, another along the right,

outflanking the barricades by means of boulevards expressly designed for that purpose by Louis-Napoleon's city planner. On the north and east they had the passive cooperation of the Prussians. Their guns set fire to buildings. Montmartre was taken; Communards, including women and children, were forced to kneel where Generals Lecomte and Thomas had died and were executed.

This was among the first of the atrocities committed in pursuit of Thiers' proclamation: "Expiation will be complete!" Uncontrollable now, some Communard leaders had their hostages dragged out—gendarmes, priests and eventually the Archbishop—and lingeringly executed. Hearing the news, Delescluze covered his face with his hands and cried, "What a war!"

What a dirty war! Nor had it come to an end. Paris was burning the Tuileries Palace, the Palais de Justice, the Prefecture of Police, the Rue de Rivoli. Notre Dame was threatened, then saved, but the Hôtel de Ville was soon aflame. The rumor of *pétroleuses,* mythical women with bottles of petroleum, set the soldiers of Versailles on a witch-hunt. More than one woman with an empty milk bottle would die.

On the fifth day, when only eastern, working-class Paris was holding out, Delescluze, formally dressed in frock coat and top hat, walked to a deserted barricade, climbed to the top and awaited the bullet ending his life. It may have been the cleanest death of "Bloody Week," which ended on Whitsunday with 147 Communards lined against a wall in the Père-Lachaise cemetery and finished off.

The purge, *after* the fighting was over, was even more ruthless: the expiation was completed. The wounded were dispatched. Blackened hands among those captured were evidence of having fired a Communard *tabatière* rifle which left such traces. In one instance, a lady saw her young chimney sweep seized by Versailles troops, put against a wall and shot. In prisons, parks, streets and public squares, Communards and the innocent were shot by rifle squads, save when they were too many, and the new machine guns were used. Communard women asked no mercy and received none. The Seine was stained with red for three days.

"They died laughing," said artist Courbet, "like men sure of the future with faith in their convictions."

Hôtel de Ville burns in the last violent days of the Paris Commune. Vengeful Communards set it afire along with other famous buildings.

A young Versailles officer recalled seeing a dying man brought in on a stretcher. "The guard said he was an 'insurgent,' whereupon the man, raising himself up, cried with his last strength, 'No, it is you who are the insurgents!' and died."

In the famed Reign of Terror of the French Revolution, 2,500 died in over a year. In contrast, the Paris Commune of 1871, which lasted only two months, ended with the deaths of 20,000 to 25,000 Communards, the vast mass as prisoners. And 40,000 more were marched to Versailles for trial. Some of these, too, were executed; 10,000 were sent to prison, forced labor and notorious island settlements. The Communards, in turn, executed less than 500 of their enemies.

Adolphe Thiers had his victory parade on June 29 on a Paris racetrack. "Society," wrote Arthur Rimbaud, 16-year-old symbolist poet who had seen Paris in May,

—Society, all is reestablished:—orgies bawl and cry
Their death rattle in brothels as before,
And maddened gaslight on blood-stained walls
Flames sinisterly upwards to the dark blues
of the sky.

Barbara Tuchman, in *The Proud Tower,* says that the Comte de Mun "blamed the Commune on 'the apathy of the bourgeois class and the ferocious hatred for society of the working class.' The responsible ones, he had been told . . . were 'you, the rich, the great, the happy ones of life who pass by the people without seeing them.' "

Original designs in jewelry making

A jeweler's saw is used to cut out a design transferred onto metal (left) as another associate hammers a pattern into a pendant with a texturing tool.

Sawing, filing, hammering, polishing, Smithsonian Resident Associates learn to create their own ornaments

The creation of jewelry to one's own unique specifications has become increasingly popular as an American craft. Members of the Smithsonian Resident Associates explored this art form recently at workshops conducted by Janet Maddox, whose jewelry has been exhibited throughout the United States.

Following a discussion on tools, materials, techniques and basic design, members of the class sketched their own ideas on paper. Each design was transferred to a square of Nu-gold, brass with a higher-than-standard copper content, and cut out with a jeweler's saw. Rough edges were filed smooth, a ring clamp holding the piece firmly in place.

For a bas-relief effect, a dapping die was used. This is a block with graduated sizes of concave domes. An infinite number of textures or designs can be achieved with steel punches. Mrs. Maddox creates many of her own texturing tools from nails sawed flat and carved with saw blades and files. To keep the metal from becoming brittle as it is worked, it is usually necessary to soften or anneal it, a process of heating, then "quenching" it in cold water or a pickle of water and acid.

Their designs completed, class members polish first with coarse emery paper to remove scratches and finally finish with rouge, a mixture of iron oxide and wax which gives the metal a high luster. With the addition of a chain or clasp, the jewelry is ready to wear.

Design ideas are sketched on paper and then transferred to metal.

A wood dapping die can be used to form a convex or concave relief.

Pendants and pins above were all made by Smithsonian classes. Designs completed, they must now be polished.

Book reviews

The Last Year of Leo Tolstoy
V. F. Bulgakov
Translated by Ann Dunnigan
(Dial Press, $7.95)

In the history of mankind, certain giant figures move onto the world stage and play a major role in formulating the art and thought of their time. Sometimes the diversity of their artistic imagination spills their offerings beyond the physical event of their death, and they continue to return to the world stage bearing gifts.

Russian novelist Count Leo Tolstoy, who died in 1910, is one of these.

If in his lifetime he had offered only those 559 characters in his novel *War and Peace,* in their distinctly individual living and striving, it would have been enough. Instead, in the years since he died, some person or other is always turning up with new memoirs—many of them obliging the reader to push through a lot of tiresome nothings to dig out jeweled Tolstoyana.

In this volume, Tolstoy appears again—this time in a first publication in English of a diary kept by Tolstoy's secretary Valentin Bulgakov, Moscow philosophy student who came to live at or near Yasnaya Polyana, the now famed Tolstoy estate, in the last year of the novelist's life.

The diary entries are first of all interesting as a story of bitterness and domestic intrigue. Readers who know little about Count Leo Tolstoy, his life, or his writing, may still be absorbed in watching forceful protagonists acting in the wake of bubbling conflicts.

Tolstoy himself tries to be detached, but really is not. In this last of his years, he is trying to resolve the conflict which had raged eternally in his personal life and writings between the ways of thought and the ways of feeling—whether it was better to live peacefully as a landed aristocrat on his estate, or spend his last days in poverty to confirm in action his own disapproval of that life.

In mid-February Bulgakov quotes Tolstoy as writing to a friend: ". . . The fact that I continue to live in the family with my wife and daughter, in shameful, appalling conditions of luxury while surrounded by poverty, has been a source of ceaseless and ever-increasing torment to me. . . ." Later he said: "Every day when I go out, there stand a half-dozen ragged beggars, and I mount my horse and ride off followed by my coachman!"

The diary translation offers old family controversies ranging from how far Tolstoy's wife Sofya Andreyevna might have led a family friend down some erotic garden path to what happened over the years to the bulbous quality of the famous Tolstoy nose. Bulgakov on one occasion quotes himself instead of Tolstoy (whom he worships): "Someone has said that every man has his own special smell. Oddly enough, it seems to me that Tolstoy has a kind of very strong church smell compounded of cypress, the sacristy and communion bread."

Any writer will take to himself Tolstoy's self-assessment—that he was one of those writers ". . . who if they don't feel like writing, or aren't in the mood, write worse than a district clerk . . . the need to write must be irresistible, like a cough."

And, of course, even the title of the book warns that death lurks in the shadows beyond the samovar. His whisper is heard in an old man's cough in the night, in the bells of the troika across the snow, and even in the wind in the flowering chestnuts of that last spring—while somewhere offstage are also the rumblings of bloody revolution.

—Angèle de T. Gingras

Once a Slave
By Stanley Feldstein
(William Morrow, $8.95)

Most of this book is too much for even well-spaced reading, because the mind recoils from saturating horror. The story of the "Peculiar Institution"—slavery—originated in some 6,000 extant narratives written or dictated by slaves or ex-slaves, and their cumulative anguished breath bends many slavery myths as a strong wind might bend a magnolia.

The narratives clearly reveal slavery's main intent: to dehumanize a man to such unawareness of self and life that he would docilely accept that he truly was a chattel comparable to the master's acres, hogs, fence posts and outhouse. The "kind" and "Christian master" was equally a part of the chattel system. The "Uncle Tom" and "Sambo" were fulfillments of the dehumanizing process.

A consumptive girl was whipped to death for praying when she should have been working. Onlooking slaves "stood horrified, as if rooted in the ground." Another girl was stripped naked for "the punishment of the pump." The constant flow of water on the head and shoulders eventually produced the sensation of breaking bones and blindness.

The mind of the slave eventually becomes beyond understanding. Rationally, all shared a common bond. But the house servants looked down on the field hands; the field hands had their caste system based on colorings; all, apparently, looked aghast at other slaves whose master had less money than theirs; most disclaimed any connection with Africa and loved the United States; the more intelligent realized their potential if they were free but stayed when escape was possible. Why did many slaves ride with their young masters into the Civil War as body servants? Maybe they *had* become dehumanized.

The slaveholding class was badly scarred by what it had done. By dehumanizing others they damaged their souls. And the slaves, once free, would never be the same. One who escaped early in life reported that the influence showed in his thoughts, his superstitions, his narrow views and his awkwardness of manners.

"The infernal impress is upon me, and I fear I shall transmit it to my children, and they to theirs! How deeply seated, how far reaching, a curse it is!"

—Scott Hart

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Smithsonian highlights

Anacostia Neighborhood Museum
". . . Toward Freedom," is a special exhibit which graphically illustrates the Civil Rights Movement since 1954. It focuses chronologically on three main areas of accomplishment: education, public accommodations and voting rights. The Museum is located at 2405 Nichols Avenue, S.E., Washington, D.C.

National Collection of Fine Arts
"Unique Systems for Living: Furniture 1971" is an exhibition of 50 winning entries from a national competition of low-cost furniture designs. Opens March 22.

"The Legend of John Henry" is retold in 12 narrative canvases on loan by the artist, Palmer Hayden, through March 14.

"Thief of Souls" is a retrospective collection of paintings by Romaine Brooks. (See article on page 38.)

Arts and Industries Building
"Space and Artists" consists of 60 paintings inspired by the space effort. The exhibit includes sculpture, impressionistic and abstract paintings and realistic illustrations.

"Aerial Exploration" displays two famous aircraft used in exploratory ventures. The *Sirius* flown by Charles Lindbergh and his wife "North to the Orient" and the *Gamma* flown by Lincoln Ellsworth and H. Hollick-Kenyon across Antarctica.

Museum of History and Technology
"Do It the Hard Way: Rube Goldberg and Modern Times" is a special exhibition of cartoons, writings, sculpture and inventions. (See article, SMITHSONIAN, November 1970.)

Museum of Natural History
Bird carvings by John Drake of Carlsbad, New Mexico, are on display and include two passenger pigeons presented to the Smithsonian by the artist with a cardinal, meadowlark and robin on loan.

"John Muir (1834-1914)" is a teaching exhibition on the conservation movement in the United States at the turn of the century. (See article on page 16.)

Division of Performing Arts
March 6: "Music from Marlboro"—chamber music.

Smithsonian Commons
Luncheon facilities are now open for staff, resident scholars and all members of the Smithsonian Associates. Located in the original Smithsonian Building and open weekdays from 11:30 to 2:00 o'clock, the Commons offers a complete buffet luncheon for $2 upon presentation of a membership card.

Traveling Exhibition Service
Brooklyn, New York—"Recent Graphics from Prague" (Long Island University, Brooklyn Center, March 6 to April 4).
Los Angeles—"Art Protis" (University Galleries, University of Southern California, March 13 to April 11).
Salt Lake City, Utah—"The Color of Man" (Utah Museum of Natural History, March 20 to April 11).

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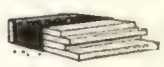

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Tours for Associates

Tours are planned for members of the Smithsonian Associates. For further information write: Smithsonian Center, Great Hall, Smithsonian Building, Washington, D.C. 20560.

East African Safari and Indian Ocean Cruise: March 20 to April 15. (A few spaces still available)

"No-Tour" Tour: Includes excursion fare from Dulles International Airport to Paris and return. Members make their own arrangements for travel in Europe. May 26 to June 16.

Roman Archaeology: An inexpensive tour for students, teachers and parents. Visits include Rome, Naples and Sicily—July 1 to July 22.

Qantas "No-Tour" Tour: Departs from New York with paid overnight stay in London; final destination Vienna or Frankfurt (depending on response) and return—July 15 to August 5.

South America: A 21-day tour of Colombia, Ecuador, Peru and Brazil with emphasis on archaeological sites, colonial and contemporary architecture, museums and private collections—August 4 to August 25.

"No-Tour" Tour: Includes round trip from Dulles International Airport to London and return, with members making their own arrangements for travel in Europe—September 9 to September 30.

Domestic Tours.

Now offered for Smithsonian Associates—a series of work-and-study tours covering various aspects of science, history and technology.

Florida Marine Biology: A six-day collecting-and-study trip to Placida, Florida. Time will be equally divided between boat-and-shore collecting and laboratory work on the collected specimens. A one-day visit to the Cape Haze Laboratory is also included—April 16 to April 21.

Strawbery Banke and Portsmouth, New Hampshire: A tour of the historical preservation and restoration project at Strawbery Banke; also tours of private and public houses outside the restoration area—May 23 to May 26.

By Carol Cutler

An attempt to enliven big, boring, biennial surveys of American art

This year the Corcoran Gallery, which runs one of the oldest and most prestigious of all, let the artists choose half of it

Most people, in their cynicism, do not look for anything fresh or imaginative to come out of Washington —just more of the same old thing. So the fact that something new *can* start in the Capital—and in the art field at that—is causing some wonderment.

One of America's oldest, most respected and, at times, stodgiest art biennials has put on a new face. The Corcoran Gallery's just-opened 32nd Biennial Exhibition of American Painting might just revolutionize the organization of such shows.

In this case the selection of artists and works has not been made by an august jury or curator on his own. Walter Hopps, director of the Corcoran since last April, has shared the responsibility for the selection with, of all people, the artists themselves. In his innovative format, Hopps decided to divide the challenge of trying to present a broad cross-section of good work currently coming out of artists' studios across America.

He himself selected 11 painters who he believes are producing some of the most important, or at least most interesting, art in America today. In turn, he asked each of the 11 to choose another painter to be exhibited, making 22 participants in all. What is unusual about this concept is that it represents the individual taste of not just one man but of 12. It also differs from jury-selected shows because jurors tend to defer to one another and, often as not, end up with safe middle-of-the-road choices.

In its debut at the Corcoran the new scheme has been full of surprises, and has shaken some of the ho-hum attitude nowadays reserved for such survey shows. Nevertheless, there are obvious pitfalls in the Hopps plan that will call for alertness by future practitioners of his format.

First of all, artists have a notoriously cavalier attitude toward such mundane things as dates and deadlines, so their selections and their selectees' works can be expected to arrive late or nerve-wrackingly close to it. Then there is the not-so-small matter of artistic ego. This makes one wonder whether the painter will be absolutely objective in his selection and choose the artist who is really the best he knows (other than himself, naturally). There is also the danger of his selecting a good but not-so-talented friend.

Despite such risks, there are, of course, advantages in having painters pick other painters. All too often there is some truly important artist, quietly working away in his studio, perhaps teaching as well, who somehow has escaped the attention of dealers and collectors and is known only to his fellow artists. As a recent example, one thinks of André Lhote who had next to no following in Paris, except among the artists who greatly admired him for his fine technique and even more for his brilliant technical theories. Years later the critical public discovered Lhote, too. But art history books are full of such cases—Henri Rousseau, Modigliani and Gauguin among them.

The Corcoran exhibitor, in making his selection, is free to choose a colleague who shares his style—which would reinforce his own particular artistic statement—or to choose someone he admires and may not

Carol Cutler has covered the Paris art scene for Art in America *and the* International Herald Tribune. *Now in Washington, she wrote about the Venice Biennale in the June 1970* Smithsonian.

even know. The result is a stimulating and surprise-filled package.

The director who thought up this pioneering plan was as surprised as anyone else when the choices came in—pleasantly surprised, he is delighted to add. When he gave his own 11 painters complete freedom of choice, he meant it, and there was no quarterbacking from his office. Hopps' contribution started months ago when he realized that the Corcoran Biennial needed a dramatic face lifting. It had been creeping toward change, but—to remain valid—it needed to do more than creep; it needed to leap.

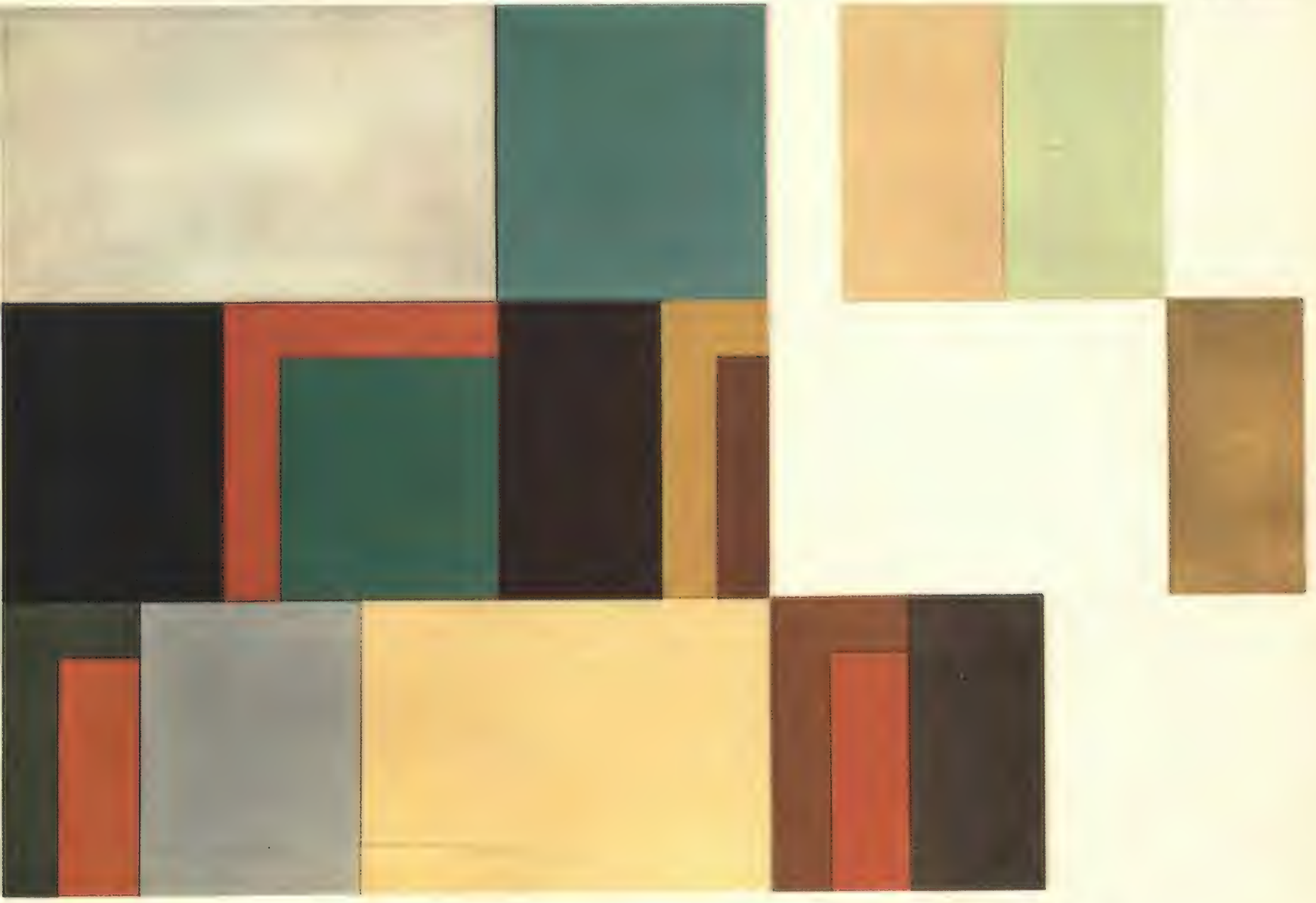
The Corcoran Biennial was founded in 1907 "in recognition of the just claim that American art ranks with the best contemporary art of the world, and for the purpose of promoting and encouraging its further development. . . .The display is confined to original oil paintings, by living American artists, not before publicly shown in Washington." That was in 1907. Since then the Biennial has been held every other year, more or less regularly. The original trust fund endowment for it was set up by Senator and Mrs. W. A. Clark (he was a Montana Democrat who served one term at the turn of the century), but it has recently been supported to a large degree by the Morris and Gwendolyn Cafritz Foundation.

World War II brought about the first major policy change "in view of the existing national emergency and the heavy demands on railroad transportation, labor and other facilities." Previously, the exhibition had had two sections—one invitational and the other jury-selected from thousands of canvases that arrived from all over the country. In 1943 it was decided to "confine the present show to invited work only, thereby eliminating 95 percent of the burden of transporting paintings by rail." This was the first all-invitational Corcoran Biennial.

Then, in 1955, another departure was tried: an entirely jury-selected show. It turned out to be an unqualified disaster. Over 2,000 paintings were submit-

David Novros, *Untitled* (1970), oil on canvas.
Separate panels with patches of wall showing between.

Bykert Gallery



Eugenia Butler Gallery

Richard Jackson, *Study for Project.* The work is to be created on the spot. Paint is applied to a stretched canvas, which is placed face down on the floor, given a quarter turn, and left there.

Opposite: Sam Francis, *Untitled* (1970), acrylic on paper. "Beautiful colors, idiosyncratic forms."

ted for judging and a mere 64 were finally hung. Over the years, the ratio of paintings accepted by the Corcoran juries was very small—from less than one percent to three percent of the entries. It soon became clear that the country's best talent was not entering the competition. Why should they? They were successful enough already, and felt above submitting their work for judging. But, even so, now and then a prize-winner would emerge from the uninvited entries, and so the officials were hesitant to change the rules.

Meanwhile, a ground swell was building up against the awarding of prizes. As far back as 1951, the painter Edward Hopper, chairman of the jury, came out against the tradition. "The problem of prize awards is an old one," he said, "and most juries feel that the advancement of art is not furthered by the awarding of prizes. Even though one concedes that there is a best picture, or pictures, or piece of sculpture in an exhibition, the fallibility of human judgment and the wide difference of opinion make the task of a just selection almost impossible, and the result must be unfair to many artists and misleading and confusing to the layman. If a system of purchases could be instituted, instead, that would eliminate the grading according to merit of the prize system and the implication of superiority, and considerable gain would be made in fairness."

Tradition is hard to break, and it wasn't until the last Biennial, in 1969, that Mr. Hopper's advice finally took hold. Instead of prizes a purchase award was given, and the Corcoran added to its permanent collection a crisp nonobjective painting by Robert Swain. That choice was made by James Harithas, then director of the Corcoran.

Mr. Harithas made another basic change by making the Biennial all-invitational. He invited 22 artists to submit work; all but three were little known to the art public. He did not attempt a survey of the many kinds of painting being done, but concentrated on contemporary abstract painting in its purest and most geometrical form. Harithas put his personal taste on the line and declared, "If you don't like the show, I'm the guy to blame."

Walter Hopps entered the scene as acting director, following the resignation of Harithas last summer, and was later appointed director at the age of 37. He had come to Washington in 1967 as director of the Washington Gallery of Modern Art, which has since been merged with the Corcoran. His extra twist of letting the artists choose half of the Biennial was in keeping with his continuing concern for the good but unrecognized artist, a concern that goes back to his earliest involvement with art.

While in California and still in school he became upset by how much good art was being ignored by the official adult art world (he was 20 at the time). He reacted by organizing a cooperative gallery in Los Angeles. Continuing direct involvement with California art led to his appointment as curator, then

Courtesy of the artist

director, of the forward-looking Pasadena Museum.

California artists still figure prominently in Mr. Hopps' selections, as do New York artists. Middle America, geographically speaking, is skipped. This is not just a personal decision by Hopps; it is a fact that the two most important art-producing centers are today on the east and west coasts.

Washington painters are not included because they are regularly given exposure at the Corcoran in a series of smaller shows. Instead, the Hopps-selected list contains three categories: "distinguished senior" artists, "established" artists and up-and-coming artists who are little known or rarely seen locally. A number of important artists in the senior category (like Frank Stella, Jasper Johns, Helen Frankenthaler) were considered but not included because of the wide exposure they have had in Washington. The Biennial has thus assumed an educational as well as a critical role.

In the first category Hopps places Roy Lichtenstein and Sam Francis; in the second group are Philip Pearlstein, Peter Saul, Richard Estes, Robert Irwin, Frank Lobdell and Ed Ruscha; less well known are David Novros, Richard Jackson and David Stephens.

As many people do, Hopps feels that the broad survey shows are a thing of the past. How can any one exhibition present a true picture of everything going on in this vast country? A little bit of everything ends up with nothing, is the way this thinking goes. What Hopps has assembled is a dissimilar set of artists who work in contradictory techniques and styles. His major concern was a presentation of the many painting languages of the day, not a view-in-depth of only one school of work, no matter how important or valid.

So one sees both abstract and figurative work, highly colored and delicate palettes, and meticulously organized as well as wildly spontaneous expressions. Even before knowing what kind of work was going to be brought in with the artists' choices, Hopps, with his own group of ten, already had tremendous diversity. Take David Novros and Sam Francis, for example. Both are abstract artists in the fullest sense, and both approach their work from completely opposing points of departure.

The attack of Sam Francis is completely spontane-

ous. His work is emotionally charged and full of idiosyncratic forms. The colors are always beautiful, even when reduced to a minimum, pushed or squeezed to the edge of the painting by the expanding weight of an enormous field of stark white (page 65).

David Novros, on the other hand, leaves nothing to chance. His format is carefully planned and immaculately executed. He stretches separate panels across the wall in a parade of beautifully orchestrated colors, with occasional spaces left for the wall to show through (page 63). It's the fresco of the 1970s.

Abstraction with a spontaneous approach also defines the work of David Stephens, but somehow chance is always under control in his rich wall hangings. These unstretched canvases have a tapestry-like quality to them, a ceremonial somberness. Where the abstraction of Sam Francis is bright and exhilarating, Stephens' version is full-throated and reflective.

Then there is the abstraction so spontaneous, so fleeting, so completely unpredictable that it was created right on the spot the day before the Biennial opened. Richard Jackson does what is often called "processed art." His concern is accommodating each piece to a particular location. He is not a demanding type at all, in fact prefers the less than ideal areas that most artists would eschew—corridors, odd-shaped corners, even the floor. Jackson may make preliminary sketches for his project, but the actual work itself is created in a matter of minutes right where it is meant to remain temporarily, then be dismantled because it is really valid for only that one placement. When the Biennial closes on April 4, the Jackson works will be gone forever.

At the last minute he might decide to stretch a canvas along a corridor, heavily soak a smaller canvas to act as a "brush," then let it swoosh across the clean canvas like a pendulum—and that's it. The only final decision to make is whether to remove the "brush" or let it remain attached to the canvas by the viscosity of the paint. Then again, he might thickly paint a canvas, place it face down on the floor, give it a twist to leave an arc of paint on the floor around it, and leave it there (page 64). Here he plays on the viewer's curiosity: What *is* on the other side?

Another abstractionist belongs to the carefully planned school. Robert Irwin works with compositions of pure light. He pushes to the extreme the experience of absorbing the impulses and energy of light fields. This is a completely cerebral approach, demanding no physical or emotional reaction. Since his work is directed toward on-the-spot awareness, Irwin permits no photographs.

Then there is Frank Lobdell, who works in a style that bridges both abstract and figurative (page 67). The figure is always there, but arabesques envelop it until it seems veiled and ghostly. These haunting structures are more dominated than dominating.

Which brings us to the four frankly figurative painters, all making authoritative artistic statements, but in four totally different keys. Peter Saul's voice is the most strident and vulgar—deliberately so. Saul's painting technique is traditional, his subject matter anything but. He aims in his highly charged compositions to grate and irritate us into awareness. It is a special kind of protest art that deliberately provokes by its very outrageousness.

Polka-dotted and loudly American

The figurative style chosen by Roy Lichtenstein is as crisp, static and meticulous as Saul's is barbaric. With his familiar comic strip blow-ups, Lichtenstein fashioned a biting, cynical statement out of something that was banal and commonplace. Magnification can indeed be a vicious thing. The brash poster colors have softened lately, and though subjects may even be foreign (like his variation on Claude Monet's Rouen Cathedral series), Lichtenstein's polka-dotted, benday-processed way of looking at things still comes out unmistakably and loudly American.

Richard Estes freezes motion in his paintings as much as Lichtenstein. But he adds something else—a deafeningly quiet ambiance that borders on the sinister. The human figure as such never appears, but its presence is always felt. With great technical virtuosity he paints cityscapes especially—the honky-tonk, glass and steel and neon trappings that make up the urban scene. He zeroes in on a small vignette, magnifies it to a penetrating degree that manages to instill a heavy, forlorn feeling. His work, in a way, is a more external view of what Edward Hopper painted.

The coolness of Estes and the heat of Saul blend in

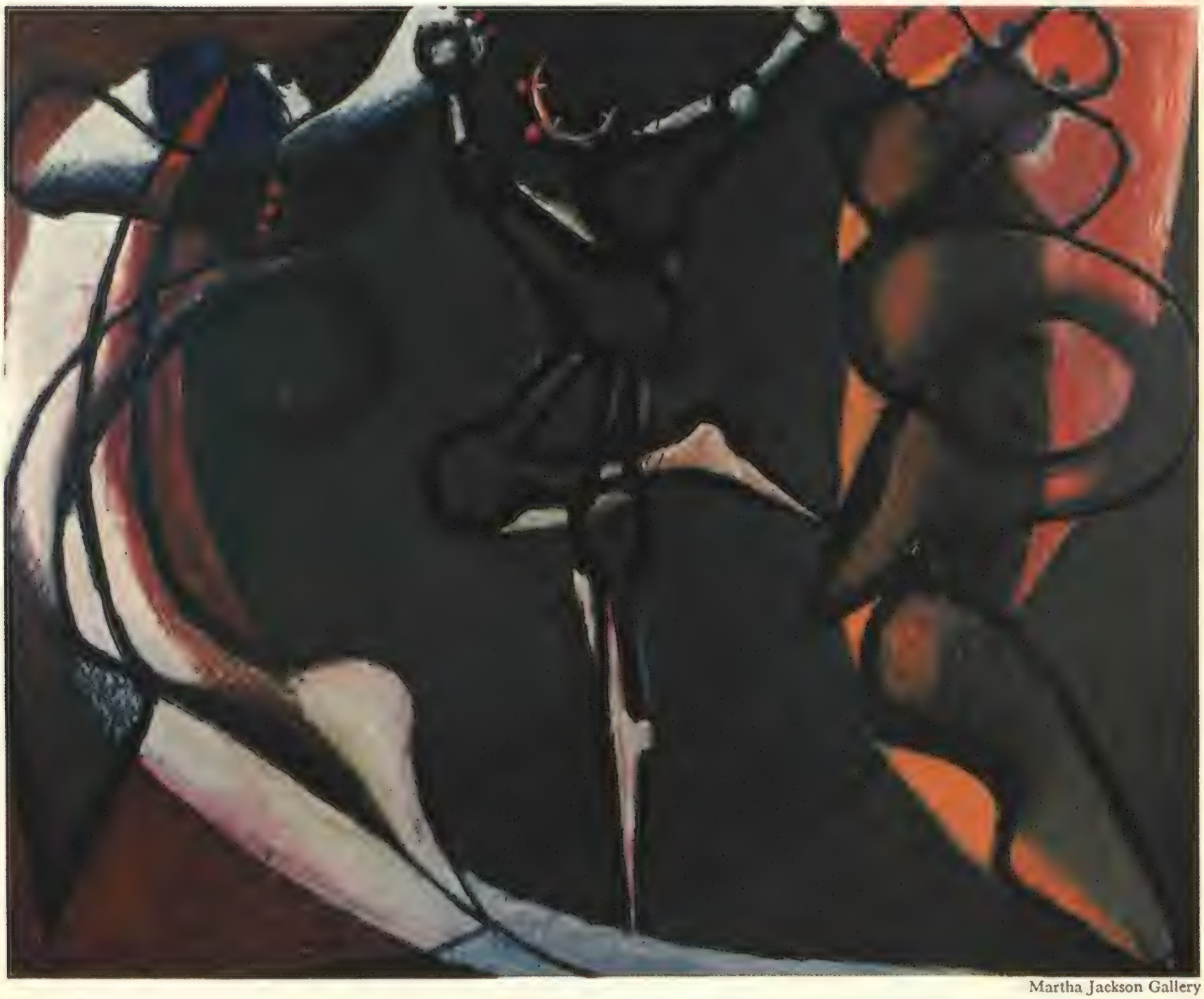
the very figurative, very nude work of Philip Pearlstein. New York critics hail his exhibitions as remarkable events and declare him one of the finest draftsmen of the day. What they like is the exaggerated fleshiness of the figures that automatically seems to strip them of any real emotional appeal. These heavy, honest bodies are arranged much the way a still life might be. In the end, for all their nakedness, they are cool and analytical, not at all sensuous or earthy.

So there are 11 artists with statements divided in many ways. Making an even more complicated and fascinating equation is the second 11 that these artists chose: Ed Moses (Sam Francis), Robert Gordon (Roy Lichtenstein), Robert "Josh" Young (Robert Irwin), Clyfford Still (Frank Lobdell), Alex Katz (Philip Pearlstein), Wayne Thiebaud (Richard Estes), Peter Dean (Peter Saul), Robert Duran (David Novros), Frank Owen (Richard Jackson), Simmie Knox (David Stephens) and Joe Goode (Ed Ruscha).

Without even suspecting it, the choices made by the artists echo in a way the make-up of the show that Hopps put together. The artists come mainly from New York and California; Clyfford Still fills the distinguished senior artist role to overflowing; Alex Katz, Wayne Thiebaud and Robert Gordon have firmly established their reputations; and up-and-coming aptly describes the rest of the roster. The work is equally divided between abstract and figurative, of every possible persuasion.

One might have expected a mixed bag of tricks from such an unpredictable way of putting a show together. But, although it is indeed a mixture, the 32nd Corcoran Biennial has enough vitality and character to restore the pulse of life to a potential cadaver.

Frank Lobdell, *Dance V* (1970), oil, 67″ x 60″.
"The figure is always there . . . veiled and ghostly."



Martha Jackson Gallery

The "shark lady" measures one of her subjects,
a bull shark, on the dock at Cape Haze.

By Irene Kiefer

Eugenie Clark: at ease among the sharks and eels

A deep-diving, spearfishing, popular book-writing, college-teaching, shark-training slip of an ichthyologist

On the sofa in her unpretentious suburban Washington home, the diminutive woman belies the label, "Shark Lady." But for Eugenie Clark, her post as associate professor at nearby University of Maryland is the latest stopping-off place in a lifelong, worldwide affair with fish.

As she relaxed late on a wintry afternoon, she seemed far removed from skin diving, sharks and the South Seas. "As a woman in a mainly male field, I've tended to be noticed more—and criticized more. But this has been to my advantage. I've probably had to work harder than a man to prove myself."

On oceanographic cruises she has frequently lent a hand with the cooking chores. "Why shouldn't I? I can't handle some of the heavy gear we have to work with, but I can cook—and I like to." She also thinks that morale is better when a woman or two are along and points out that Jacques Cousteau's wife usually accompanies him on his voyages.

Eugenie Clark's career started on the Saturdays she spent as a child at the old New York Aquarium. It has since taken her to Micronesia, where she learned to spearfish (and earned the title for her first book, *Lady with a Spear*); to the Red Sea to study poisonous fish; and to the Gulf coast of Florida, where her widely publicized shark-training experiments led to a second, recent book, *The Lady and the Sharks.*

Doesn't she now find her winters as a college professor a bit tame? "Not at all. I like teaching. I like young people. They have a right to be heard—but not," she adds, "a right to disrupt an entire institution." When Maryland students struck about a year ago, some of the faculty joined in, but not Eugenie Clark. "I went to my class. I never take roll, but about the usual number came. Maybe even a few extras—my students often bring friends to class."

She tries to impress on her students that a great deal is going on in nature—even in the most commonplace things—but to see it requires careful scientific observation. Guppy fanciers, for example, seeing the male almost constantly chasing the female, flipping his anal fin, but never catching her, concluded that males were "firing" sperm through the water. Eugenie Clark separated a male and a female, then put them together. "They copulated," she says. Why the misconception about how guppies mate? "They probably mate early in the morning at first light. No one had bothered to watch them at that hour." What were the males doing, chasing the females all day? "Just keeping in practice, I suppose."

Her teaching schedule still leaves time for research. When she gets in her new laboratory in late spring, she plans to seek answers to some puzzles she has been mulling over since she left Florida in 1965. One such puzzle involves the cow-nosed ray, a large fish (three-to-four-feet wide) with a whipping tail and poisonous spines. While in Florida she discovered that these rays gather by the thousands in huge three-dimensional schools. Why do they school in such numbers? She doesn't think these heavily armed fish need to gather for protection. They're found year-round in the waters off Florida, so migration isn't an answer. Their stomachs were generally found to be

Irene Kiefer is a Washington-based science writer. Her article on bioluminescence appeared in last month's issue of SMITHSONIAN.

empty, so feeding was apparently not the reason, and the condition of the reproductive glands showed it was not the mating season. So why do they school? Eugenie Clark intends to find out. Such schools could protect submarines from visual and sonar detection, so her research may reveal answers to practical, as well as purely scientific questions.

Her experiments with sharks started almost by chance. Anne and William Vanderbilt, who owned an estate in an isolated area on the west coast of Florida about 40 miles from Sarasota, read *Lady with a Spear* and decided to establish a laboratory where the local marine life could be studied. In early 1955, the Cape Haze Marine Laboratory was born with Eugenie Clark as its director. On the first day, a fellow scientist called to ask if she could supply him with shark livers for his cancer research. With the help of a local fisherman, she hooked two sharks the first time out—and Eugenie Clark herself was hooked on sharks.

Her shark research took many directions but, of all her many experiments, the most rewarding were those with live sharks in the stockaded pen built in the water along the Cape Haze dock. She started with a pair of adult lemon sharks, an active species that adjusts well to captivity. Since almost nothing was known about how much food a large shark needs, she began with feeding experiments. (Her sharks needed about two pounds of fish a day.)

Could the sharks, now accustomed to being fed, learn to perform a simple task? Sharks were generally thought to be rather stupid—in addition to being difficult to work with—so they had never been subjected to the classical conditioning experiments.

How to educate a shark

She rigged up a white target in the water and connected it to a bell. To get the food she dangled in front of the target, the shark had to press the target, ringing the bell. After six weeks of training, she put her sharks to the test, lowering an empty target into the water. Within a few minutes the male, the bolder of the two, repeatedly pushed the target until the bell rang and then took the food tossed him. Within three days, the female followed suit. Dr. Clark trained the sharks for several weeks more until they would rush the target, turn, and swim eight feet down the side of the pen to catch the food as it was dropped into the water. "Not bad," says Eugenie Clark, "for a stupid shark."

The abundance of sharks at Cape Haze proved enticing to other scientists. In the first year alone, 28 came to visit and work. At dissection times—which occurred almost every day—the scientists lined up to get liver samples, blood, pituitary glands. Subduing a live shark was a problem, until someone hit on the idea of injecting a shot of ethyl alcohol into the belly. Gin and vodka work as well, Dr. Clark found out later on a trip to the Red Sea.

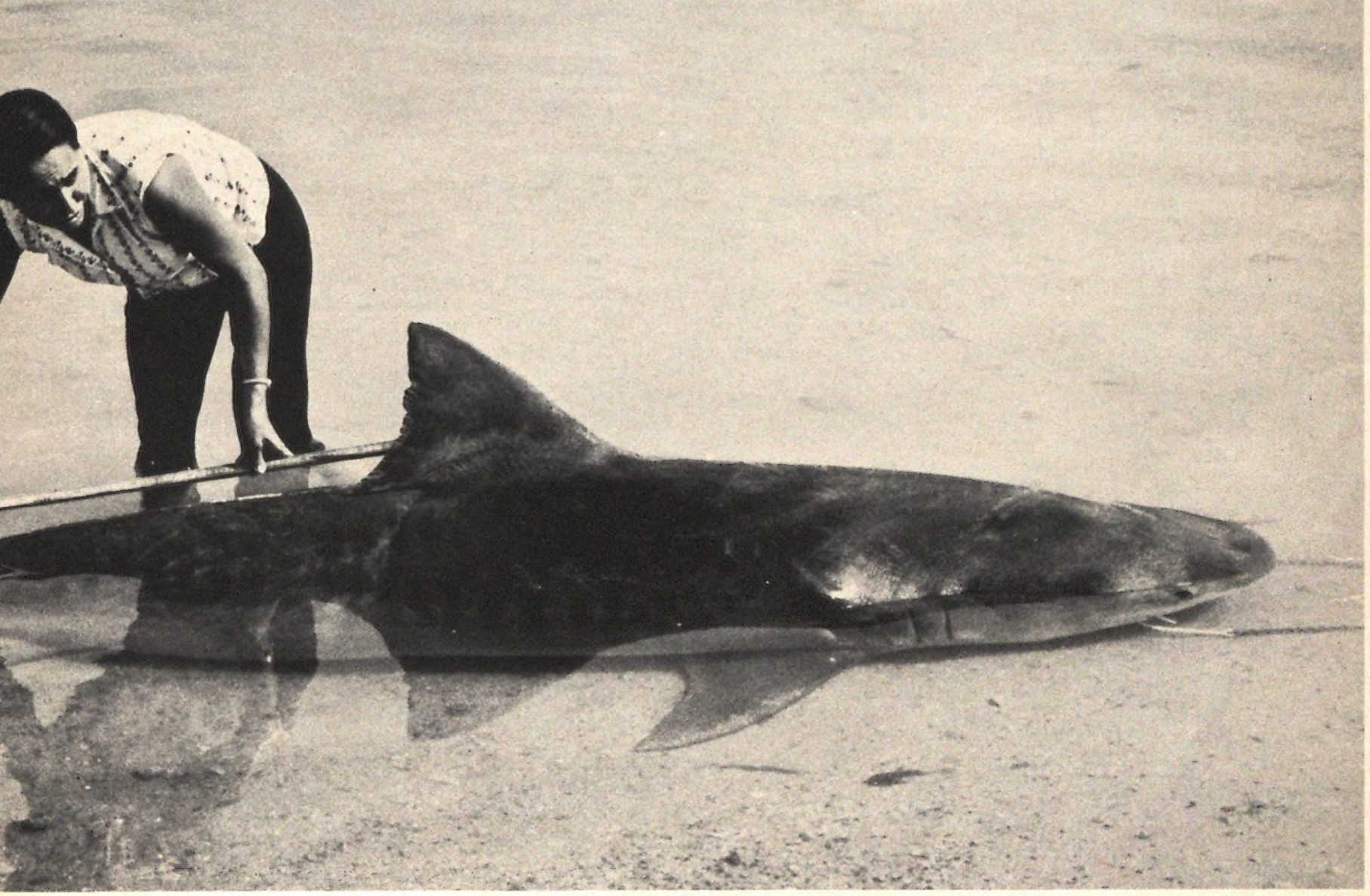
Born in New York City, Eugenie Clark herself was taken to the beach before she was two years old. Her Japanese-born mother, widowed when Eugenie was a baby, had to work, and one Saturday when the little girl was nine, dropped her off at the Aquarium to amuse herself. She amused herself that day and for years of Saturdays thereafter. She soon acquired a 15-gallon aquarium, and the Clarks' apartment teemed not only with fish, but toads, salamanders, snakes and anything else she could get her hands on. During these years she became interested in William Beebe, the American naturalist who developed the bathysphere, and by the the time she entered Hunter College, she was determined to study zoology. Her mother tried to persuade her to take typing and shorthand, pointing out that she might be able to start out as some famous ichthyologist's secretary. "But I was obsessed," Dr. Clark recalls. "I didn't

want to be Beebe's secretary. I wanted to be Beebe."

Mother was right. When Eugenie Clark finished Hunter, World War II was under way, and few jobs were available for inexperienced zoologists. Her first job was as a chemist for Celanese Corporation doing research on plastics. But she spent her evenings at New York University, earning a master's degree and later a doctorate in zoology. While finishing up her doctorate, she took part in the Pacific Science Board's program to study those islands of Micronesia which formed the U.S. Trust Territory.

The year following her Pacific trip she spent in Egypt as a Fulbright Research Scholar. At the Marine Biological Station at Ghardaga (about 30 miles south of the Gulf of Suez), she studied fishes of the Red Sea. These fishes differ markedly from those of the Mediterranean, although the waters are separated by only about a hundred miles. In the isolated waters of the Red Sea, specialized forms have evolved over thousands of years—about 20 percent of its species occur only there—and very little scientific information about them had been published before Eugenie Clark arrived in early 1951. In her subsequent visits,

Scuba diving for gobies, small Caribbean fish, or handling a 12-foot tiger shark (below), Eugenie Clark has always felt perfectly safe.

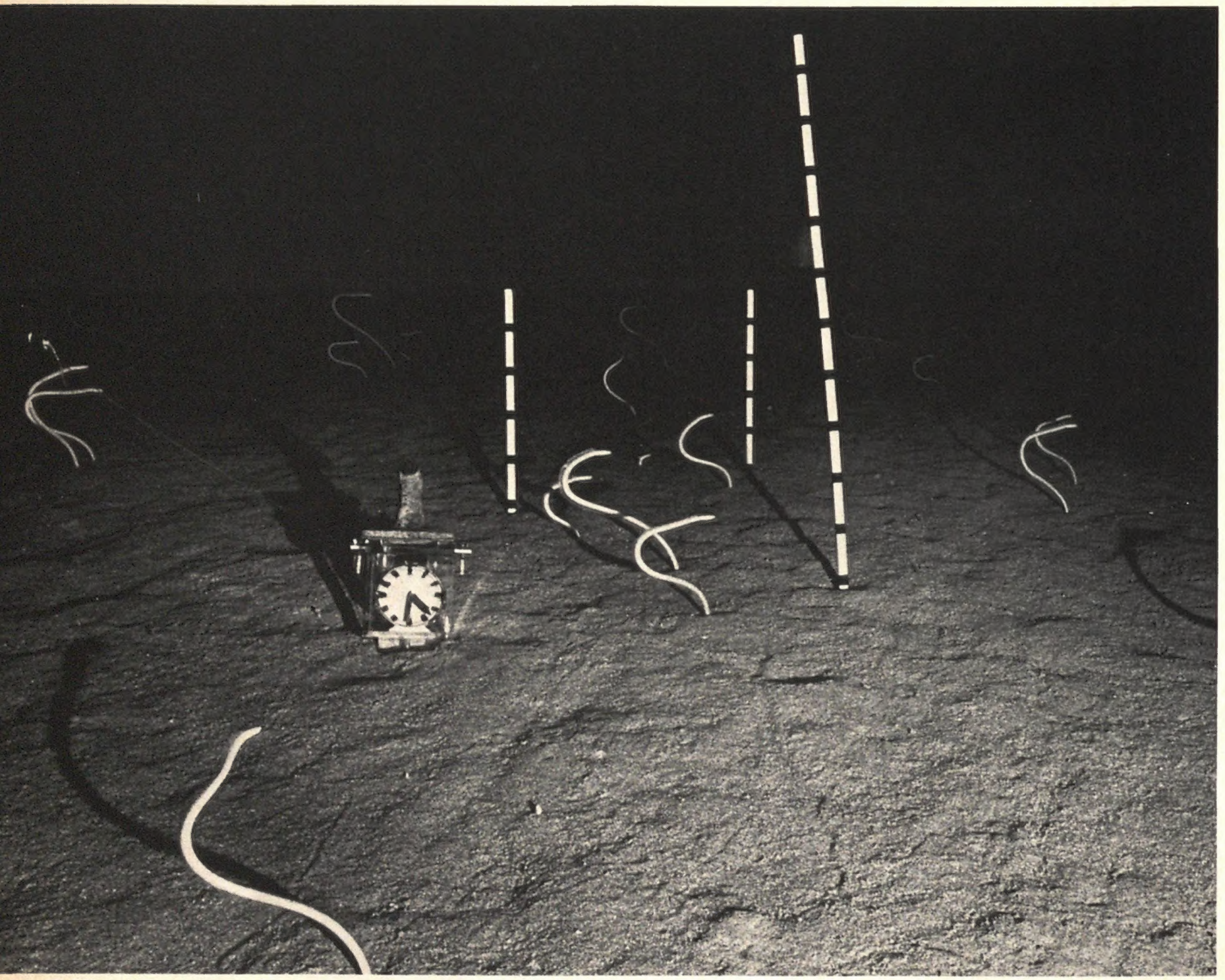


now sponsored by the Smithsonian's Office of Oceanography and Limnology, she has continued her taxonomic studies and started work on garden eels, elusive fish that seem to grow by the thousands in gardens, their long bodies rising two or three feet out of the ocean bottom.

Her time-lapse photographs tell her all about the garden eel's daily cycle, she says, laying the photographs on a coffee table and animatedly explaining when and how garden eels feed, sleep and mate. The sea bottom where she works is subjected to unusually large shifts in current and the garden eels are good current meters. They face the current and lower their heads to form question marks; the stronger the current the more pronounced the question mark.

Hasn't it been a dangerous career for this petite woman who barely reaches five feet? Not particularly. Probably her closest call was in her first dive, made during a summer spent at the Scripps Institute of Oceanography. The hose feeding her helmet had recently been mended with a garden hose attachment. It came loose and the air being pumped to her never got to the helmet. She made her way to the surface and, undaunted, tried again in a few minutes.

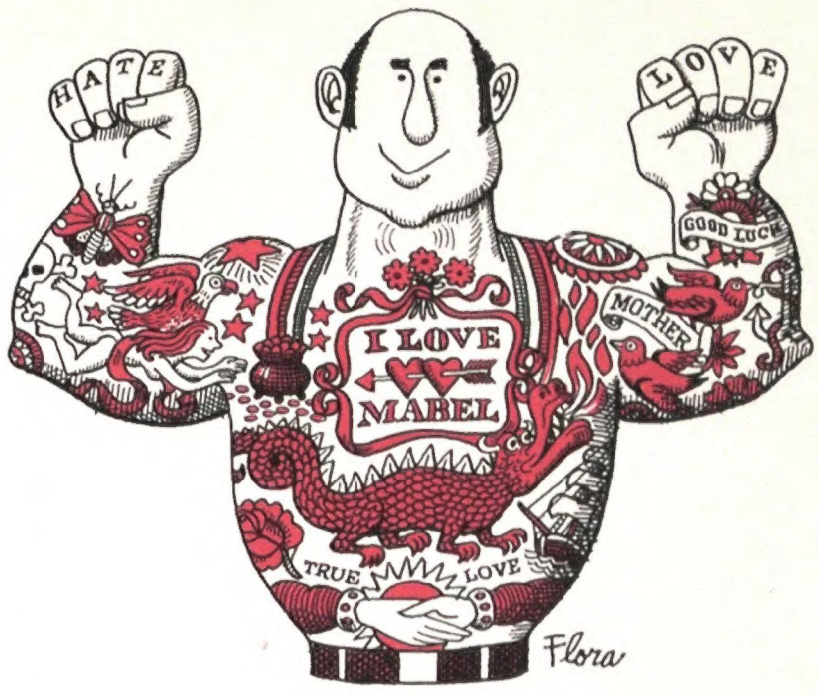
Once driving on her way to deliver a lecture, she stopped suddenly at a red light. Stretching out her right arm to prevent her lecture materials from falling, she hit the mounted jaw of a 12-foot shark on the seat beside her. That is the only time Eugenie Clark lost blood to a shark.



In a Daliesque vista on the Red Sea bottom, garden eels 'grow' from burrows, bending like question marks into the current, undisturbed by the current-measuring equipment in their midst.

By Patrick Ryan

There's a rainbow round my shoulder and a dragon on my chest



As is ruefully familiar to any mariner who ever wakened after a bacchic night to find himself emblazoned with "I Love Mabel" tattooed on his chest, the impulse is frequently followed by regret. When Mabel turns him down, he must face the pain of removal, or spend a depleted sex life confined to girls named Mabel, or keep his shirt on, no matter what.

The allure of the subcutaneous needle reaches dizzying social heights. "My appointment book reads like *Burke's Peerage*," noted a London artist. George V, the Sailor King, received a dermal decoration while a midshipman and later had it "improved" at the behest of Queen Mary.

The ladies themselves are not immune. Lady Randolph Churchill, Sir Winston's mother, picked up a "dainty" ornamentation. Film buffs recall Groucho Marx singing of "Lydia, The Tattooed Lady":

> *On her back is the Battle of Waterloo,*
> *Beside it the Wreck of the Hesperus too,*
> *And proudly above waves the Red, White and Blue. . . .**

And offscreen, there was the French starlet who accepted $100 for having the Eiffel Tower entwined in rambling roses tattooed on her 17-year-old left buttock. The film company later had the picture peeled off by a plastic surgeon and sold it for "the price of a Picasso," according to the girl's counsel when she sued for moral and esthetic injury.

Fortunately for future tattoo-repenters, dermatologists at the University of Cincinnati reported experimental success in using a laser to obliterate redundant skin inscriptions. Like ordinary light, the coherent laser beam passes through the transparent skin and gives up little of its energy in heat. But the colored dye particles beneath the skin absorb the heat and are instantly vaporized and expelled with minimal pain.

Development of this laser-eraser into routine treatment would be timely, since there are current signs that tattooing is heading for a renaissance. Among the easy riding youth of California it is now the vogue to become illuminated people. West Coast needle artists are enjoying a boom in embossing torsoes with signs of the zodiac, peace doves and psychedelic slogans.

Care is advisable in selecting pellicle patterns. Many have particular symbolism. If tempted to have your biceps made gaudy with an eagle carrying off a naked lady, bear in mind that this is the insignia of the international brotherhood of procurers. Butterflies are widely recognized as the emblem of thieves. If your peccadilloes put you in danger of a horsewhipping, it may be worth remembering that a crucifixion scene across the shoulders was traditionally regarded in the Royal Navy as protection against flogging. Hopefully, no one would dare lay a lash across Christ's body.

If offered the classic "Hunt Scene" in a British tattoo parlor, first check the price. This vista covers the entire canvas of your back. Lord Ailwyn, discussing a recent bill forbidding the embellishment of minors, recalled how as a young midshipman he carried a message to his admiral and found that august personage rising modestly from his bath. The broad back confronting the youth was decorated with the panorama of a complete hunt in full cry: Horses, hounds and huntsmen all careered downward from top to literal bottom, in hot pursuit of the fox, of which only the brush and hind legs were visible since it was going to ground.

At second and more foresighted views, it might be a good investment to wear such a tapestry. Peeled of your pelt when you're dead, it could perhaps get you immortalized in some Metropolitan Museum of Gruesome Art.

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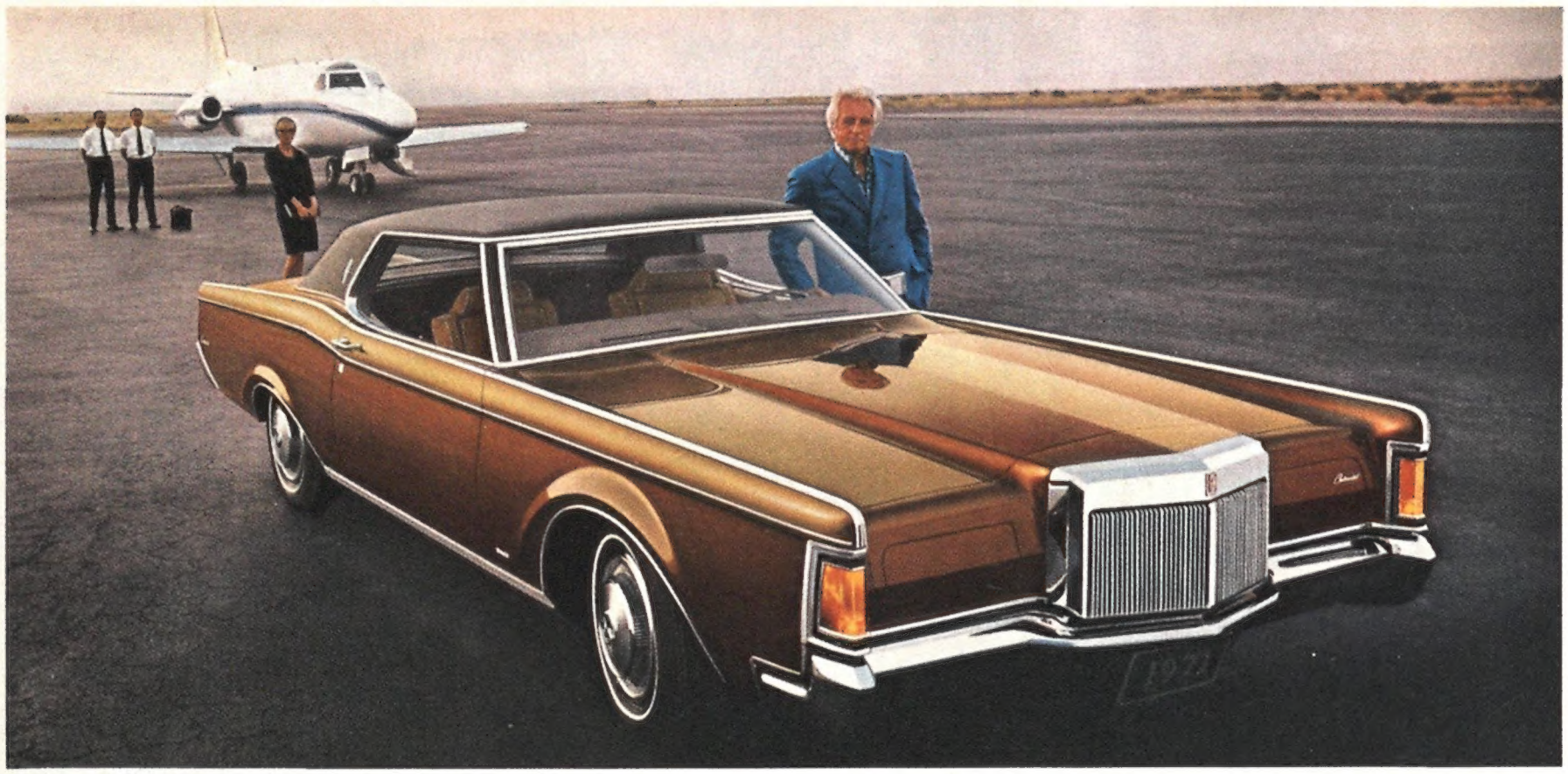

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